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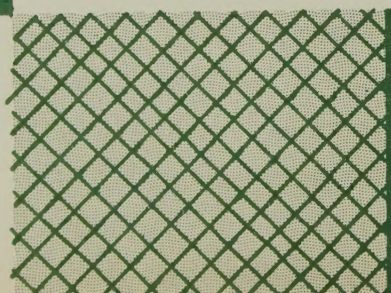

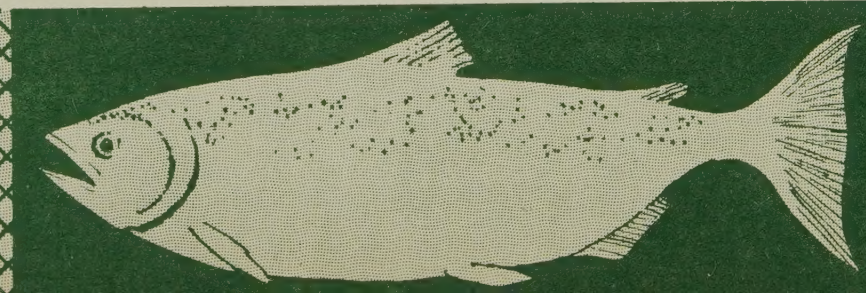

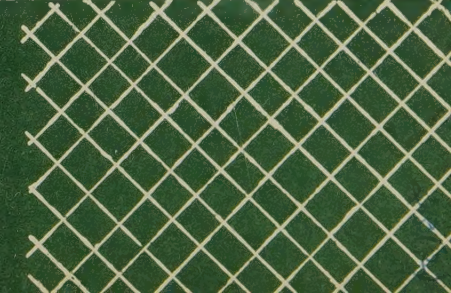

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FOREWORD

The Department of the Interior's Bureau of Commercial Fisheries publishes the monthly journal Commercial Fisheries Abstracts as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

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A description of the numbering system is contained in FISHERY LEAFLET No. 232: "FISHERY TECHNOLOGICAL ABSTRACT CARD SYSTEM," by Maurice E. Stansby, K. L. Osterhaug, and F. Bruce Sanford. The Leaflet is obtainable free from this Bureau.

Use of trade names in abstracts does not imply endorsement of commercial products.

0.321 (1.80) STUDIES ON MARINE INVERTEBRATE COLLAGENS--I. SOME COLLAGENS FROM CRUSTACEANS AND MOLLUSCS

Kimura, Shigeru, Yoshihiro Nagaoka, and Minoru Kubota (Tokyo University of Fisheries, Konan-4, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 8, 743-748 (August 1969)

In 1968, the authors reported on their isolation and partial characterization of an insoluble collagen obtained by pepsin treatment from the body of abalone (Haliotis discus). In the present paper, they extend that study to include collagens from the mantle of pearl oyster (Pinctada martensii), the body walls of squid (Todarodes pacificus) and octopus (Octopus vulgaris), and the subcuticular tissues of spiny lobster (Panulirus japonicus) and blue crab (Portunus trituberculatus).

An analysis of the physical properties and electrophoretic patterns revealed that these invertebrate collagens have the same fundamental molecular properties as vertebrate collagens have. However, they are richer in hydroxylysine, acidic amino acids, amide nitrogen, and carbohydrate than vertebrate collagens, and the ratios of hydroxylysine to lysine are always higher. Their thermal stability corresponds to that of the collagens from warm-water fishes, and the denatured collagens contain both α and β components. All the preparations contained 3-hydroxyproline and 4-hydroxyproline.
[1 figure, 4 tables, 19 references]

 Abstracter: L. Baldwin

0.35 (0.38) METHYL OCTADECADIENOATES AS PROTECTORS AGAINST INACTIVATION OF ALKALINE PHOSPHATASE BY γ-RADIATION

Akiya, Toshimi, T. H. Madson, J. R. Chipault (University of Minnesota, The Hormel Institute, Austin 55912)
Lipids 4, No. 5, 398-400 (September 1969)

Previous workers have found that polyunsaturated fatty acids or their derivatives are sensitive to high energy radiations and react readily with many free radicals. The present authors, therefore, suggest that these lipids could modify the effects of ionizing radiations on other sensitive compounds. Accordingly, the authors used alkaline phosphatase to test this hypothesis. They found that methyl cis,cis-, cis,trans-, and trans,trans-9,12-octadecadienoates protect alkaline phosphatase from inactivation by γ-rays. The mechanism for protection is not known. The polyunsaturated methyl esters may react with the highly oxidizing $HO\cdot$ and $HOO\cdot$ free radicals that are the major primary products from irradiation of aqueous solutions. The authors suggest that the products may be nonradicals or less reactive free radicals incapable of oxidizing the tyrosine residue.
[1 table, 3 references]

 Abstracter: F. T. Piskur]

0.35 STUDIES ON THE LOCATION OF SULFHYDRYL GROUPS IN ERYTHROCYTE MEMBRANES WITH MAGNETIC RESONANCE SPIN PROBES

Sandberg, Howard E., Robert G. Bryant, and Lawrence H. Piette (Department of Biochemistry and Biophysics, University of Hawaii, Honolulu 96822; and Department of Chemistry, Stanford University, Palo Alto, California 94305)
Archives of Biochemistry and Biophysics 133, No. 1, 144-152 (August 1969)

Sulfhydryl groups have been implicated in certain physiologically important membrane phenomena, such as the induction of the hemolysis of erythrocytes by p-mercuribenzoate and other mercurial reagents. In the present study, the authors applied electron paramagnetic resonance (EPR) and nuclear magnetic resonance (NMR) techniques, involving the spin label N-(1-oxyl-2,2,6,6-tetramethyl-4-piperidinyl) maleimide and ^{35}Cl ion, to determine the location of the sulfhydryl groups of bovine erythrocyte membranes. Results of sulfhydryl blocking experiments with mercuric ion, p-mercuribenzoate, N-ethylmaleimide, and iodoacetamide gave evidence that the modified maleimide molecule that serves as the spin label is covalently bound to the membrane sulfhydryl groups. The EPR spectrum of spin label bound to ghost erythrocyte membranes consists of at least two types of sulfhydryl sites that differ in the motional mobility of the spin label. The strongly immobilized site is observed on both the intact erythrocyte and the ghost cell. The concentration of the binding sites for the spin label is 9.8×10^{-18} mole per cell. NMR measurements of the ^{35}Cl line width in the presence of mercury gave a sulfhydryl content of 9.1×10^{-18} mole per cell. These NPR measurements further indicated
(over)

 Abstracter: F. T. Piskur

0.38 STUDIES ON FISH MUSCLE PROTEASE--II. PURIFICATION AND PROPERTIES OF A PROTEINASE ACTIVE IN SLIGHTLY ALKALINE pH RANGE

Makinodan, Yasuo, and Shizunori Ikeda (Dept. Fish., Fac. Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 8, 749-757 (August 1969)

In 1963, the authors assumed that fish muscle protease might participate in the lowering of gel strength that occurs in kamaboko between 60° and 65° C. The proteinase they found was optimally active at pH 8.0 and seemed to be quite different from the enzymes reported by a number of other investigators. In this present study, they purified a proteinase from ordinary carp muscle by heat treatment, ammonium sulfate fractionation, and Sephadex G-200 chromatography. The results showed that this proteinase is clearly different from any of the cathepsins reported so far. It has a pH optimum at 8.0 and a temperature optimum for 2-hour reaction at 65° C. It is relatively stable at 60° C. It is active on casein and hemoglobin and relatively active on endogenous protein; it is not affected by Na^+ and K^+. Zn^{++}, Co^{++}, and Ni^{++} inhibit its activity considerably and p-chloromercuribenzoate inhibits it completely, whereas EDTA and KCN cause a considerable increase in the activity, as do 2-mercaptoethanol and cysteine.
[7 figures, 5 tables, 25 references]

 Abstracter: L. Baldwin

0.35

that the chloride ion exchange with the mercury labeled sulfhydryl groups is blocked, suggesting that the SH groups are located within the lipoprotein matrix. [6 figures, 21 references]

0.35 THE BIOSYNTHESIS OF ALKYL GLYCERYL ETHERS BY MICROSOMAL ENZYMES OF DIGESTIVE GLANDS AND GONADS OF THE STARFISH ASTERIAS FORBESI

Snyder, Fred, Boyd Malone, and M. L. Blank (Medical Division, Oak Ridge Associated Universities, Oak Ridge, Tennessee 37830)
Biochimica et Biophysica Acta, Lipids and Lipid Metabolism 187, No. 3, 302-306 (October 28, 1969)

This study shows that the microsomal system responsible for the biosynthesis of alkyl ether linkages in glycerolipids originally found in neoplasms of mammals is also present in normal cells of a more primitive animal. The authors postulate that the formation of alkyl glyceryl ethers from glyceraldehyde 3-phosphate and fatty alcohols may be of importance throughout the entire animal kingdom.
[2 figures, 1 table, 18 references] [Abstracter: F. T. Piskur]

0.36 (0.7) THE ROLE OF LIPIDS IN HEME SYNTHESIS

Yoneyama, Yoshimasa, Hideo Sawada, Masazumi Takeshita, and Yoshiki Sugita (Department of Biochemistry, School of Medicine, University of Kanazawa, Kanazawa, Ishikawa, Japan)
Lipids 4, No. 5, 321-326 (September 1969)

The combination of ferrous iron and protoporphyrin is an important enzymic reaction for living organisms as the last step of heme formation. The present paper deals with a study on the role of lipids in protoheme ferrolyase from chicken erythrocyte stroma with particular attention to the effects of various purified phospholipids. [8 figures, 3 tables, 17 references]
[Abstracter: F. T. Piskur]

0.6 (0.7) FRACTIONAL CRYSTALLIZATION OF SALTS FROM SEA WATER

French Patent 1,526,971
Bonnet, Pierre M. J. (pat.)
Chemical Abstracts 71, No. 14, 63996r (October 6, 1969)

0.38 STUDIES ON FISH MUSCLE PROTEASE--III. PURIFICATION AND PROPERTIES OF A PROTEINASE ACTIVE IN ACID pH RANGE

Makinodan, Yasuo, and Shizunori Ikeda (Dept. of Fish., Fac. Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 8, 758-766 (August 1969)

Proteolytic enzymes in the muscular tissue of fish are important not only to the physiology and pathology or the fish but to the preservation and utilization of the fish food. In this study, the authors subjected the ordinary muscle of carp to acid-heat treatment, ammonium-sulfate fractionation, acetone fractionation, and Sephadex G-200 chromatography. The proteinase resulting had a pH optimum at from 2.8 to 3.0 and a temperature optimum for 1-hr. incubation at about 50° C.; it was stable at 37° C. but rapidly lost its activity at 55° C. It was active on acid-denatured hemoglobin, casein, and the myosin fraction of the protein but was inactive against carbobenzoxy-L-glutamyl-L-tyrosine, benzoyl-L-arginine amide, and glycyl-L-tyrosine amide that had been used as substrates for cathepsins A, B, and C, respectively. Na+, K+, Zn++, Co++, KCN, ethylenediaminetetraacetic acid, cysteine, and p-chloromercuribenzoate did not affect the enzyme's activity; Ni++, glutathione, and 2-mercaptoethanol did.
[7 figures, 6 tables, 16 references] [Abstracter: L. Baldwin]

0.37 [DK METRIC WATER DETERMINATION IN FISHERY PRODUCTS]

Deschacht, W. (Ministerie van Landbouw, Centrum voor Landbouwkundig Onderzoek, Gent, Belgium)
Mededelingen van de Rijksfaculteit Lanbouwwetenschappen te Gent 33, No. 4, 1567-1577 (1968)
Food Science and Technology Abstracts 1, No. 9, 1178, Item 9R233 (September 1969)

A method is described wherein the dielectric constant is measured to permit estimation of the water content of fish products. Samples of fish product are homogenized (the grinding procedure being governed by the moisture content of the product) and distilled with dioxane for 20 or 25 min. to eliminate the influence of fats and salts. The dielectric constant of the distillate is determined and correlated with the moisture content of the sample. The author suggests that the method is as accurate as the AOAC drying method. [3 references]
[Extracter: L. Baldwin]

0.8 (0.9) (7.43) SYNTHETIC SEA WATER

South African Patent 6,803,301
Kelley, William E., and Vernon C. Goldizen; Aquarium Systems, Inc. (pat.)
Chemical Abstracts 70, No. 26, 117978m (June 30, 1969)

0.38 (9.13) TEMPERATURE DEPENDENCE OF CHOLINESTERASE AND LACTATE DEHYDROGENASE IN THE GUINEA-PIG, HEDGEHOG AND CODFISH

Johansson, Bengt W.
Acta Physiol. Scand. 77, No. 1-2, 1-6 (September-October 1969) (Karolinska Institutet, 104-01 Stockholm, Sweden)

In 1963, Huttunen and Johansson suggested that the differences in the temperature characteristics of various enzymes are an important factor in the differences in temperature resistance of homeothermic, hibernating, and poikilothermic animals. To investigate this hypothesis, the author studied the temperature dependence of lactate dehydrogenase (LDH) in brain, heart, and skeletal muscle and of acetylcholinesterase (AChE) in brain tissue of guinea pigs, hedgehogs, and codfish. The temperature of maximal LDH activity was higher in the tissues of guinea pigs than in the tissues of the other animals. The values showed by codfish tissues were almost equally low at the temperature for maximal activity and at 5° C. Maximal AChE activity after both 10-5 min. and 30-25 min. appeared at an appreciably higher temperature in the brain tissue of guinea pigs than in that of cod; the corresponding activity in hedgehogs was in an intermediate range. The difference between maximal AChE activity and activity at 5° C. was, as for LDH activity, small for the cod. [12 tables, 6 references]

0.6 SENSORY SPECTRUM

Hougen, F. W. (University of Manitoba, Winnipeg, Canada)
Food Product Development 3, No. 6, 128, 133 (October 1969)

This article reviews a symposium on "Aroma Research for the Benefit of Industry--Today and in the Future," held in Sandefjord, Norway, April 24 and 25, 1969. The topics covered at the conference included those on the flavor or aroma of beverages, fish, meat, fruit and berries, and fat and margarine; off-flavors in food during storage and from packaging materials; flavor research in industry; and correlations between subjective and objective methods of organoleptic testing. Proceedings of the symposium will be published.

The following delegates presented papers applicable to the fisheries:

Dr. E. Sundt, Firmenich & Cie., Geneva, Switzerland (the history of flavor research, some present-day achievements, and some likely future developments)
Dr. K. de Jong, Unilever Research Laboratory, Vlaardingen, Holland (flavor problems in the fat and margarine industry)
Dr. R. Hardy, Torry Research Station, Aberdeen, Scotland (aroma research relevant to fish processing)
Fil. lic. Roy Nilsson, Institute for Meat Research, Kavlinge, Sweden (flavor problems in the meat industry)
Dr. C. Weurman, Central Institute for Nutrition and Food Research, TNO, Utrecht, Holland (the role of research institutions in an industry's aroma research program)

(over)

0.5 (7.0) MICROORGANISMS IN FOODS: THEIR SIGNIFICANCE AND METHODS OF ENUMERATION

Thatcher, F. S., and D. S. Clark (eds.)
Published by University of Toronto Press, Toronto 5, Ontario, Canada. 234 pp. (1968) $12.50
Reviewed by Thaddeus Midura
American Journal of Public Health 59, No. 9, 1771-1772 (September 1969)

This book has three stated purposes: to describe the significance of specific groups of bacteria in foods, to recommend internationally acceptable methods for the detection and enumeration of these organisms, and to describe the composition and methods of preparing the recommended media. It is divided into three parts accordingly. Among the microorganisms considered are salmonellae, shigellae, enteropathogenic Escherichia coli, Vibrio parahaemolyticus, staphyloccoci, Clostridium botulinum, C. perfringens, entercocci, aerobic mesophilic bacteria, and enteric indicator organisms. Appendices make recommendations concerning safety precautions to be taken in the laboratory and give additional matters to be considered in sampling.

2.1121 THE GERMAN ONE-BOAT MID-WATER TRAWL - PART 4. TRAWL NET SIZES AND DESIGNS

Schärfe, J.
Fishing News International 8, No. 10, 20-23 (October 1969)

Practical fishing experience has confirmed the obvious assumption that the catching efficiency of a midwater trawl will, fishing conditions constant, increase as the size of the net opening increases. The effective net opening, as distinguished from the actual net opening, can be defined as the product of the vertical and horizontal diameter of the opening after double the fish's flight reaction distance has been subtracted from each diameter. (The flight reaction distance is the distance--observed to be from 3 to 8 meters--that fish tend to keep between themselves and the framing lines and the netting.) Thus, the larger the net opening, the larger the net must be--and the greater the towing resistance. To keep towing resistance to a minimum, mesh size must be large and twine must be thin. This article describes German development work, both successful and unsuccessful, on increasing the size and strength of midwater trawls.

Following trials with two-panel nets and square four-panel nets, a four-panel net with rectangular cross section was found to give quite satisfactory results. The side panels of this net are equal, but they are narrower than the upper and lower panels; thus such mechanical drawbacks as the unequal load distribution in the square nets (caused by the nets' insufficient vertical opening, slack side panels, and consequent shift of the whole load to the upper and lower panels) are avoided. The rectangular four-panel net, including four panels in

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7.85 DETERMINATION OF CLOSTRIDIA IN FOODS
(2.05)
Anonymous
Food Technology in Australia 20, No. 11, 539 (1968)
World Fisheries Abstracts 20, No. 3, 24 (July-September 1969)

In bacteriological food investigation, detection of clostridia is usually restricted to a qualitative determination in the liquid medium. However, without quantitative determination, explanations of a Perfringens poisoning, for example, is difficult. H. J. Snell and R. Levetzow (1968) report on the sulfite polymyxin sulfadiazine agar, with which clostridia can be easily detected even in routine testing. They describe four cases of food poisoning that were caused by Perfringens. Quantitative determination with the selective nutrient media gave microbial counts of between 10^6 and 10^9/g. The authors emphasize that the usual methods of anaerobe cultivation, as used in bacteriological meat investigations, do not always suffice and that more attention should be paid to the selective quantitative determination of sulfite-reducing clostridia.
[Reprinted in [Extracter: L. Baldwin]

0.38 ESR PROBING OF MACROMOLECULES: FUNCTION AND OPERATION OF STRUCTURAL UNITS WITHIN THE ACTIVE SITE OF α-CHYMOTRYPSIN

Kosman, D. J., J. C. Hsia, and L. H. Piette (Biophysics Laboratory, Department of Biochemistry and Biophysics, School of Medicine, University of Hawaii, Honolulu 96822)
Archives of Biochemistry and Biophysics 133, No. 1, 29-37 (August 1969)

Classical studies of α-chymotrypsin (α-ChT) function have been performed previously with p-nitrophenyl esters as enzyme substrates. Now, for the first time, the present authors have approached the problem of α-ChT function using the new technique of spin-labeling. In this study, various deacylation conditions were imposed upon a model system. The spin-labeling data suggests that there is a cooperative link between regions of aryl binding on the enzyme and one of amide bonding. [8 figures, 2 tables, 28 references] [Abstracter: F. T. Piskur]

2.1121
the tunnel and the cod end, is now the standard German, commercial, one-boat, midwater trawl.
So that the thinnest possible net twine could be used, high-quality nylon 66 or nylon 6 (Perlon) was chosen for the experimental nets. Mesh size stretched was 560 mm., the largest machine-braided netting available at the time. Larger sizes are now available, and the author suggests that they should be tried, especially in the front part of the net where, operating on the fish's flight reaction distance, their guiding effect would not adversely affect catching efficiency. Fishing trials in weather of up to Force 9 confirmed that the 23 tex × 156 twine size used with 560 mm. mesh-size nets was quite adequate.
The largest version so far of the one-boat midwater trawl measures 1,114 meshes circumference with 560 mm. mesh size stretched, equivalent to about 3,100 meshes circumference at 200 mm. mesh size stretched. This net has a rectangular cross-section and was made up by adding large meshed wings and front belly to an existing net of 1,600 meshes circumference, 200 mm. mesh size stretched. The twine size of the large net is 23 tex × 156; the headline is 123.4 m. and the footrope 136 m. long. This net and a similar one with 948 meshes circumference have been used for herring fishing. The author describes their catching efficiency as successful almost beyond expectation. [5 figures]

2.2 FISH SORTING APPARATUS

Canadian Patent 814,240 (1969)
Wulff, H. (Nordischer Maschinenbau Rudolf Baader)
Food Science and Technology Abstracts 1, No. 9, 1179, Item 9R241 (September 1969)

This sorts fish according to variations in thickness.
[Abstracter: L. Baldwin]

0.6 MEAT TENDERIZING

U.S. Patent 3,445,240
Bedrosian, K. and D. L. Robach; Whirlpool Corp. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Meat is tenderized by storing it under controlled conditions of temperature, relative humidity, and atmospheric content. [Abstracter: F. T. Piskur]

0.6 DIETETIC MEAT PRODUCT

U.S. Patent 3,447,932
Olsen, F. C. and J. C. Trautman; Oscar Mayer & Co. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

The coherence of meat particles in sausage and meat loaf products is improved by the addition of mixtures of potassium chloride, potassium polyphosphate, and potassium polyphosphate. The mixture are substituted for the sodium chloride.
[Abstracter: F. T. Piskur]

0.6

Docent I. Bosund, Nordreco Ab, Bjuv, Sweden (development of off-flavors in foods during storage)
Dr. John Fleckenstein, Milprint Inc., Milwaukee, Wisconsin (contamination of food with off-flavors developed in the packaging material)
Professor A. Kramer, University of Maryland, College Park, Maryland (correlations between subjective and objective methods of organoleptic testing).

2.3 A SKINNING MACHINE FOR SOLE

Anonymous
La Pêche Maritime 48, No. 1091, 114 (1969) (In French)
World Fisheries Abstracts 20, No. 3, 2 (July-September 1969)

A principal component of this stainless-steel machine is a cylinder fitted with teeth. A blunt knife makes a cut in the head of the fish, and the skin is removed, leaving the fish and the skin intact. The roe are also protected during the operation. The machine occupies 1 m^2. (10.7 ft^2.) only and can skin from 90 to 150 kg. (198 to 330 lb.) of sole an hour. [Extracter: L. Baldwin]

2.117 HOW GOOD ARE LAMINATED HULLS?

Anonymous
World Fishing 18, No. 9, 54-55 (September 1969)

Three papers presented at the Conference on Fishing Vessel Construction Materials are reviewed. [See Commercial Fisheries Abstracts 22, No. 7, 7-8 for a complete list of the papers read at the conference, held in Montreal, Canada, in October 1968.] The first, "A Comparative Assessment and Future Outlook for Material in Fishing Vessel Construction, with Particular Reference to Plywood," by John Brandlmayr, considers five different materials that have particular advantages for the small-boat builder. Using a four-point scale, the author rates these materials for use on sea-going vessels of up to 100 ft. as shown in the table on the back of the card (1 is the highest grade). Since commercial rather than experimental construction is considered, ferrocement, high-strength and corrosion-resistant steels, and special plastics are not included.

The second paper, "Plywood as a Construction Material for Fishing Vessels," is also by Brandlmayr. It discusses the manufacture and physical properties of plywood as specified in Canadian Standard CSA 086-1959, and describes a fast gillnetter built of sheet plywood. It also comments on the properties that make plywood advantageous for use as bulkheads, decks, and superstructures no matter what the hull material may be.

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 Abstracter: L. Baldwin

3.2490 THE EFFECT OF LOW TEMPERATURE FREEZING ON QUALITY CHANGES IN COLD STORED COD

Kelly, T. R., and J. S. Dunnett (Unilever Research Laboratory (Colworth), Greyhope Road, Torry, Aberdeen, Scotland)
Journal of Food Technology 4, No. 2, 105-115 (June 1969)

When fish muscle is frozen, the water in the tissues crystallizes out as ice; as the temperature is lowered greater proportions of ice form. As a result dehydration of the tissue components and concentration of the tissue salts occur. Researchers, therefore, have speculated that freezing may irreversibly damage the proteins of fish and that the damage will be greater the lower the freezing temperature. The present study was carried out to establish whether "deep" frozen fish fillets deteriorate faster than "shallow" frozen fillets when both are stored at the same temperature. Cod fillets were frozen at -7° C. by immersion in brine; at -15° C. and -30° C. by blast freezing; at -77° C. by immersion in an acetone-CO_2 bath; and at -195° C. by immersion in a liquid air bath. Assessments of the quality of the fillets were made by objective and organoleptic tests. The authors found that the quality changes in the stored cod fillets occurred at a rate that was independent of the freezing temperature.
[8 figures, 5 plates, 13 references]

 Abstracter: F. T. Piskur

3.2490 QUALITY IN FROZEN COD AND LIMITING FACTORS ON ITS SHELF LIFE

Kelly, T. R. (Unilever Research Laboratory (Colworth), Greyhope Road, Torry, Aberdeen, Scotland)
Journal of Food Technology 4, No. 2, 95-103 (June 1969)

The shelf life of fish depends upon how quickly the quality of the fish changes with time. Quality in fish, as far as the consumer is concerned, includes contributions from the quality attributes flavor, odor, appearance, and texture. The present paper reports on a study of the changes in texture and flavor acceptability in cod fillets stored at -7° C. Assessments of toughness, dryness, and overall texture of the cod fillets were made organoleptically. The author found that in high pH cod, development of adverse flavor during frozen storage limits the shelf life, whereas in low pH cod adverse changes in texture limit the shelf life. The figure on the back of this card shows the relation between the pH of the cod fish muscle and the storage life of the fillets. The author suggests that similar diagrams for different storage temperatures and different species would be of use both to the fish processor and to the fish scientist.
[7 figures, 1 table, 11 references]

(over)

 Abstracter: F. T. Piskur

3.2490 SENSORY AND OBJECTIVE MEASUREMENTS OF THE QUALITY OF FROZEN STORED HADDOCK OF DIFFERENT INITIAL FRESHNESS

Connell, J. J., and P. F. Howgate (Ministry of Technology, Torry Research Station, Aberdeen AB9 8DG, Scotland)
Journal of the Science of Food and Agriculture 20, No. 8, 469-476 (August 1969)

The quality of frozen haddock fillets was assessed by a taste panel and by a series of objective tests. The fillets were prepared from fish held in melting ice for various periods and were stored in the frozen state at -14°, -22°, and -29° C. The measured changes in the texture and flavor of the fish fillets were compared with the changes in objective parameters to determine the value of the objective parameters in predicting eating quality of the fillets.

For frozen haddock, determinations of either trimethylamine or hypoxanthine offer nearly equally good predictions of flavor changes resulting from initial variations in icing treatment of the fish. Deteriorations resulting from frozen storage can be predicted better by protein extractability determinations than by cell fragility determinations. The authors state that, in principle, the acceptability to a consumer or a group of consumers of frozen fish of any quality can be predicted within the limits of error from objective measurements if the relevant relations are known.

The authors further state that the quality of frozen haddock deteriorates faster than that of cod stored under the same conditions. Also, the objective

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 Abstracter: F. T. Piskur

3.2490

measurements of protein extractability and cell fragility change during frozen storage of haddock more slowly than they do for cod stored under the same conditions. [9 figures, 5 tables, 9 references]

3.63 MEAT DRYING

German Pending Patent Application 1,492,730
Yarrow, and Co. Ltd. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Meat products are dried at controlled elevated temperatures but below the critical temperature levels. [Abstracter: F. T. Piskur]

3.27 [THE EFFECT OF THAWING METHODS ON CHANGES
(1.29) IN THE PROTEIN OF SPRATS]

Bal, V., S. A. Vasil'eva, and S. I. Safronova
Rybnoe Khozyaistvo 45, No. 3, 56-58 (1969) (In Russian)
Food Science and Technology Abstracts 1, No. 9, 1178, Item 9R238 (September 1969)

A block of sprats was thawed by being sprayed with water either in air or in a steam-air environment. Analysis showed that in small fish the method of thawing does not affect the content of nonprotein nitrogen, the capacity of the muscle tissue to bind water, the solubility of actomyosin, or the content of nitrogen in the protein fractions. [Extracter: L. Baldwin]

3.2490

Relation between pH of the muscle and storage life of cod fillets held at -7° C.

2.117

Construction material	Strength-weight factor	Resistance to			Cost		
		Rot, corrosion, and fatigue	Abrasion	Weathering	Maintenance	Initial A*	Initial B*
Plywood (GRP sheathed)	2	3	3	3	2	1	2
Solid wood	3	3	4	4	3	2	3
Fiberglass	2	1	3	1	1	3	1
Steel	3	3	1	4	3	2	3
Aluminum	1	2	2	2	1	4	4

*A - One hull of a kind.
*B - More than one hull of a kind.

The third paper, "Laminated Wood as a Fishing Vessel Construction Material," by E. E. Buswell, discusses glue-laminated timber as produced by member companies of the Laminated Timber Institute of Canada. It points out the advantage of a builder's being able to use different grades of timber in one member and discusses stresses, moisture content, and adhesives. It mentions an instance in which laminated members 140 ft. long were manufactured across the continent from the shipyard in which they were used. [1 photograph, 1 table, 3 references]

3.2499 EFFECT OF PRE-COOKING OF BALTIC HERRING ON LIPID HYDROLYSIS
(3.235) DURING SUBSEQUENT COLD STORAGE
(1.22)

Bosund, I., and B. Ganrot (Nordreco AB, S-26700 Bjuv, Sweden)
Lebensmittel Wissenschaft und Technologie 2, No. 3, 59-61 (1969)
Food Science and Technology Abstracts 1, No. 9, 1179, Item 9R242 (September 1969)

The effect of precooking fillets of Baltic herring (Clupea harengus var. membranus) on inactivation of lipolytic enzymes was studied by following the course of lipid hydrolysis during cold storage at -15° C. The fillets were cooked in a 2450 MHz microwave oven to avoid differences in temperature between the inner and outer parts of the fillets. An initial radiation period of 30 sec. was followed by 5-sec. periods four times per minute. Raw herring, herring heated 1 min., and herring heated 2 min. were stored for 4 wk. at -15° C.; 69 percent, 58 percent, and 40 percent of free fatty acids were derived from hydrolysis of phospholipids for the three types of herring, respectively. The authors concluded that the heat inactivation of the phospholipases was more rapid than that of the lipases. [5 references] [Extracter: L. Baldwin]

2.3 FISH PROCESSING

German Patent 1,292,338
Nordischer Maschinenbau Rud. Baader (pat.)
Food Technology 23, No. 10, 58 (October 1969)

The apparatus transfers fish from a magazine onto a conveyor belt that moves past cutting tools. [Abstracter: F. T. Piskur]

3.2494 (8.8) (2.00) SYMPOSIUM: MICROBIOLOGICAL PROBLEMS RELATING TO COLD STORAGE OF FISH AND SHELLFISH

Anonymous
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 8, 767-841 (August 1969) (Papers in Japanese; figures, tables, and summaries in English)

On April 5, 1969, a symposium was held at the Tokyo College of Domestic Science, Tokyo, Japan, to promote the interest of fisheries scientists in the problem of low-temperature microbiology and to summarize existing knowledge about the problem. Seven papers were presented:

1. "Distribution of Psychrophilic Bacteria Among Fish and Shellfish," by Usio Shimidu (Institute of Food Microbiology, Chiba University); 5 tables, 20 references.
2. "Effects of Low Temperature for the Growth and Survival of Microorganisms," by Hiroshi Katoh (Institute of Food Microbiology, Chiba University); 6 figures, 5 tables, 75 references.
3. "Catabolic Activities of Bacteria at Low Temperatures," by Masatoshi Sasajima (Tokai Regional Fisheries Research Laboratory) and H. Kadota (Institute of Food Science, Kyoto University); 7 figures, 4 tables, 36 references.
4. "Combined Treatment of Low Temperature and Other Preserving Means for Keeping the Freshness of Fish and Shellfish," by Tsuneo Kozima (Tokyo University of Fisheries); 4 figures, 5 tables, 33 references.

(over)

 Abstracter: L. Baldwin

6.10 (1.0154) JAPAN'S RISING DEMAND FOR FISH MEAL

Sakai, Kenji
Fishing News International 8, No. 10, 31 (October 1969)

The fish protein used by Japanese in the manufacture of animal feed comes from fish meal, as the term is generally understood, and from crude meal, a term generally applied to fish fertilizer. Because of its wide use in animal feeds, the author treats crude meal as an edible product. The total number of shore-based crude-meal plants is hard to estimate, since fishmeal plants are spread all along the coast of Japan and since many of the plants also produce crude meal; however, the total number in 1966 was calculated at around 4,470. The number of ship-borne plants is easier to determine--in 1969, 4 large factoryships and 11 large factory trawlers, operating in the Bering Sea and the Gulf of Alaska, were reducing waste fish and offal to crude meal during the manufacture of minced fish. From less than 50,000 tons in 1965, these ships are now producing over 100,000 tons of crude meal a year. Total production of such meal ashore and afloat was over 208,000 tons in 1965; it is expected to exceed 300,000 tons in 1969.

The increase in production of compounded feeds over the past 5 years reflects increased intensification of Japanese farming methods. About 4 percent of fish protein, in the form of fish meal or crude meal, is included in pig, poultry, and cattle rations; over 60 percent is included in feeds for cultivated fish. To meet the demand, the production of compounded feeds rose from nearly 7.5 million tons in 1964, to over 10.3 million tons in 1967 to an estimated 12.-plus in 1969. Fish meal and crude meal accounted for 4.9, 3.7, and 4.3 percent, respectively,

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 Abstracter: L. Baldwin

4.15 (1.7) THE HYDROCARBONS OF SHARK LIVER OILS

Kayama, Mitsu (Dept. of Fisheries, Hiroshima University, Fukuyama, Japan), Yasuhiko Tsuchiya (Dept. of Fisheries, Tohoku University, Sendai, Japan), and Judd C. Nevenzel (Laboratory of Nuclear Medicine and Radiation Biology, University of California, Los Angeles)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 7, 653-664 (July 1969)

The presence of highly unsaturated hydrocarbons (squalene, or spinacene), monounsaturated hydrocarbons (zamene), and saturated hydrocarbons (pristane) in shark liver oils has been known for decades. One of these hydrocarbons, squalene, is now recognized as an important intermediate in the biosynthesis of cholesterol. Questions still remain, however, about why the liver oils of certain deep-sea sharks contain a great quantity of squalene and little cholesterol and why squalene is accompanied by a considerable amount of pristane and a trace amount of zamene (2,6,10,14-tetramethyl-1-pentadecene) and phytadienes. The authors investigated the hydrocarbon content and composition of the liver oil from six species of shark and determined the chromatographic behavior and the infrared spectra of squalene, squalane (hydrogenated squalene), pristane, zamene, and phytadienes.

The hydrocarbon fractions of the liver oils of Triakis scyllia (leopard shark), Squalus acanthias (dogfish), Apristurus macrorhinchus, Centroscyllium ritteri, Centrophorus spp., and Cetorhinus maximus (basking shark) were separated

(over)

 Abstracter: L. Baldwin

6.190 TODAY'S BROILER: THE RESULT OF 50 YEARS OF POULTRY RESEARCH

Edens, Frank, and David Thomason (Department of Poultry Science, Virginia Polytechnic Institute, Blacksburg, Virginia)
Feedstuffs 41, No. 45, 42-43 (November 8, 1969)

Advances in nutrition, with better balanced diets; in genetics, with the development of heavier and faster-growing birds; and in pathology, with better means of controlling disease are producing fast-growing broilers. Using day-old broiler chicks, the authors conducted an experiment to demonstrate advances made in nutrition over the past 50 years. They assigned the birds to one of five experimental diets formulated as near as possible like those available in 1918, 1928, 1948, and 1968. (Because they feared that the chicks fed the 1918 diet might not survive, they also used a 1918 diet modified by addition of a vitamin premix.) The diets were fed for 5 weeks, and then the chicks were placed on display.

The weight of the birds fed the 1918, the modified 1918, the 1928, the 1948, and the 1968 diets averaged 0.64, 0.99, 1.09, 1.48, and 1.56 lb., respectively; the pounds of feed consumed per pound of bird averaged 3.59, 2.78, 2.47, 2.00, and 1.76, respectively. It is of historical interest to note the introduction of fish meal and solubles into the diets--fish meal constituted 4 percent of the 1928 diet, 5 percent of the 1948 diet, and 2.5 percent of the 1968 diet; fish solubles made up 2 percent of the 1968 diet. [4 tables]

 Abstracter: L. Baldwin

6.130 RECOVERING NUTRITIONAL ELEMENTS FROM ORGANIC MATERIAL

British Patent 1,140,005
Astra Nutrition A.-B. (pat.)
Journal of the Science of Food and Agriculture 20, No. 9, ii-158-159 (September 1969)

A process for disintegrating organic material--for example, fish--into its main components (that is, proteins, nucleotides, fats, salts, and solids) makes possible the recovery of each component in its most nutritionally usable form. The process works as follows: comminuted material is treated with NaOH at a pH of no greater than 12 in the presence of Ca^{++} (from 3.5 to 17.5 grams of calcium per kilogram of organic material) at from 30° to 40° C. in the absence of air; after from 2 to 10 min., the filtered blend is centrifuged; the oil, the intermediate, and the sludge phases that result are separated; the intermediate phase is heated, or its pH is reduced to from 4 to 9, to yield proteins and then filtered through charcoal to yield nucleotides. [Abstracter: L. Baldwin]

6.10 of this tonnage; crude meal alone accounted for 208,172 tons in 1965, 280,900 tons in 1968, and an estimated 300,700 tons in 1969. Despite this increase in production, domestic supplies cannot satisfy demands. The Japan Fish Meal Association, which each year works out expected requirements and then determines how they can be met, decided to import 148,500 tons in 1969. Thus import of about 150,000 tons of meal a year (most of it from Peru) is expected to continue.

A table gives the number of metric tons of compounded feeds used to supply Japan's five main types of fish farms (rainbow trout, carp, ayu, yellowtail, and eel). In 1967, 1968, and 1969, the meals used in these feeds amounted to 40,339; 51,594; and 51,700 metric tons, respectively. [1 table]

6.191 METABOLIZABLE ENERGY, AND PROTEIN AND FAT DIGESTIBILITY EVALUATIONS OF FISH SOLUBLES IN DIETS OF YOUNG TURKEYS

Chu, A. B., and L. M. Potter (Department of Poultry Science, Virginia Polytechnic Institute, Blacksburg, Virginia 24061)
Poultry Science 48, No. 4, 1169-1174 (July 1969)

The authors carried out two experiments to determine the digestibility of the protein and fat, and the metabolizable energy value of fish solubles. The lyophilized fish solubles were added to a basal ration at 0, 5, 10, 15, and 20 percent levels on a dry matter basis. The coefficients of digestibility of the protein were 65.9 and 68.4 percent and of the fat were 96.5 and 98.9 percent. The metabolizable energy values were 3.967±0.711 and 4.351±0.348 kilocalories per gram of dry matter. [9 tables, 8 references] [Abstracter: F. T. Piskur]

6.190 STUDIES WITH FISH MEAL AS THE SOLE SOURCE OF PROTEIN FOR THE GROWING CHICK. 1. EFFECT OF DIFFERENT SUPPLEMENTS ON GROWTH AND FEED EFFICIENCY

Schumaier, George, and James McGinnis (Department of Animal Sciences, Washington State University, Pullman 99163)
Poultry Science 48, No. 4, 1462-1467 (July 1969)

The purpose of these tests was to study the growth of chicks fed fish meal as the sole source of protein. Addition of cellulose or penicillin to a fishmeal-glucose diet did not improve the growth rate of chicks. Growth of chicks was improved by the addition of corn to the basal diet (fish meal, glucose, safflower oil, limestone, iodized salt, mineral mix, and vitamin mix) or by raising the protein level of the basal diet from 22 to 30-34 percent. The addition of corn oil or ash of corn to the basal diet did not increase chick growth. Autoclaving the fish meal used in the diet did not have any influence on the growth of chicks. [6 tables, 10 references] [Abstracter: F. T. Piskur]

3.2383 SCHACHTEL MIT DECKEL AUS PAPIER ZUM VERPACKEN VON FISCH UND ÄHNLICHEN LEBENSMITTELN [PAPER CARTON WITH LID FOR PACKAGING FISH AND SIMILAR FOODS]

West German Patent Appln. 1,283,738 (1968)
Mayo, F. (Nordischer Maschinenbau Rudolf Baader) (pat.)
Food Science and Technology Abstracts 1, No. 9, 1080, Item 9F591 (September 1969)

The cartons described are preferably 48 cm. long, 25 cm. wide, and 6 cm. deep. Their wax- or resin-coated inner surfaces, including those of the lids, have rows of indentations 1.6 mm. wide, 4 mm. deep, and 5 mm. apart. These indentations form outlet channels for the air when the full carton is pressed between the plates of a deep-freezing apparatus. After the pressing, the fish will fill the carton completely and air-filled cavities in the deep-frozen fish will be avoided. [Extracter: L. Baldwin]

3.2494 5. "Bacterial Contamination of Fish With Special Reference to Shipping and Landing of Fish Catches," by Norio Yasunaga (Nagasaki Prefectural Institute of Public Health) and K. Amano (Tokai Regional Fisheries Research Laboratory); 7 tables, 26 references.

6. "Bacterial Contamination of Fish and Shellfish With Special Reference to Occurrence of Contamination in a City Fish Market," by Shizuo Mitsumura, Takeo Katoh, Katsuo Ito, and Kiyoaki Ikezawa (Food Inspection Office, Tokyo Central Wholesale Market); 2 figures, 5 tables, 7 references.

7. "Microbial Indices: Significance and Determination of Coliforms, Escherichia coli, and Enterococci," by Susumu Horie (Tokyo University of Fisheries); 6 tables, 89 references.

4.15 by silicic acid chromatography, and their hydrocarbon composition was analyzed by gas-liquid chromatography. The liver oils of Trichiurus, Squalus, and Apristurus were found to contain small amounts of hydrocarbons, in which pristane and squalene constituted a rather high percentage. In contrast, the liver oils of the other three species contained a great quantity of hydrocarbons that consisted almost entirely of squalene and only trace amounts of pristane. Zamene and phytadienes, which are associated with trace amounts of pristane, were separated by argentation thin-layer chromatography from the distilled pristane fraction, and the chromatographic behavior and the infrared spectra of the isolated pristane, zamene, phytadienes, squalene, and squalane were determined.

The authors discuss the biogenesis of pristane and the biochemical cyclization of squalene to sterols in shark livers that are rich in lipids of high squalene content. They suggest that the primary function of the extraordinarily high content of hydrocarbons in some shark livers may be for buoyancy.

[3 figures, 2 tables, 39 references]

4.60 FAT PRESERVATIVE

U.S. Patent 3,443,970
Wolf, P. A., and A. K. Prince; The Dow Chemical Co. (pat.)
Food Technology 23, No. 9, 46 (September 1969)

Fats are preserved by adding to them a small amount of an acylacetone with or without the inclusion of a very small amount of a free radical acceptor.
[Abstracter: F. T. Piskur]

6.195 PUTTING RESEARCH TO WORK

Morrison, Spencer H.
Effects of Protein Level Sequence and Kind of Starter on Rate and Efficiency of Gain of Growing Swine and on Carcass Characteristics
Meade, R. J., J. W. Rust, K. P. Miller, H. E. Hanke, R. S. Grant, L. D. Vermedahl, D. F. Wass, and L. E. Hanson (University of Minnesota)
Journal of Animal Science 29, No. 2, 303-308 (August 1969)
Feedstuffs 41, No. 44, 32 (November 1, 1969)

As a result of findings by the Minnesota swine research group, some swine producers are tending to use more simplified pig starters containing somewhat less protein than was thought to be necessary only a few years ago. In the paper reviewed here, the authors set out to determine if different levels of dietary protein fed during the pigs' early life would have subsequent effects on their daily gain and eventual carcass composition. Two starter diets were compared, a simplified and a complex, the basic difference being the inclusion of 10 percent sucrose, 10 percent dried skim milk, and 3 percent fish meal in the complex diet.

The results from 90 litters of pigs showed that protein level sequence does not significantly influence the daily gains or the feed efficiency of pigs weaned at 5 weeks and fed the diets for 4 weeks thereafter. Although the data did not show significantly greater weights and feed intakes for the pigs at 9 weeks of age as a result of eating the complex starter, the trend toward greater intake

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 Abstracter: L. Baldwin

6.195 RESPONSE OF LAYING HENS FED ON A RESTRICTED ISOCALORIC INTAKE
(4.82) BASIS TO OIL SUPPLEMENTATION OF A LOW-FAT RATION

Balnave, D. (Department of Agricultural Chemistry, Queen's University, Belfast, North Ireland)
Journal of the Science of Food and Agriculture 20, No. 9, 556-560 (September 1969)

In 1968, Balnave and Brown showed that, although egg production, egg size, and total weight of eggs are significantly increased by adding 2 percent corn oil to a low-fat poultry diet in which the metabolizable energy (ME) intakes are equalized, no such increase will occur when the hens are allowed free access to food. Now the author has extended his investigations of the effect of dietary fat on laying hens to include oils of marine origin. Here he reports the results of a two-part experiment carried out to determine the effect of energy intake on egg production in hens fed varying levels of corn oil and cod-liver oil; the hens had been maintained on a low-fat, cornflour-based diet from their first day of age. (This diet contained only 0.35 percent linoleic acid, much less than a practical diet would normally contain.)

After 35 weeks on the low-fat diet, the hens were divided into two groups and fed diets supplemented with either 1 or 2 percent corn oil or 1 or 2 percent cod-liver oil. Both diets were fed at three different ME levels, corresponding to a daily intake of 285, 315, or 345 kcal. ME (in the corn-oil supplemented diets) and of 260, 290, and 320 kcal. ME (in the cod-liver oil supplemented diets).

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 Abstracter: L. Baldwin

6.195 PUTTING RESEARCH TO WORK

Morrison, Spencer H.
Influence of Age at Weaning and Kind and Protein Content of Starter on Rate and Efficiency of Gain of Growing Swine and Carcass Characteristics
Meade, R. J., W. R. Dukelow, R. S. Grant, K. P. Miller, H. E. Hanke, L. E. Hanson, L. D. Vermedahl, and D. F. Wass (University of Minnesota)
Journal of Animal Science 29, No. 2, 309-319 (August 1969)
Feedstuffs 41, No. 45, 54-55 (November 8, 1969)

In an extensive scientific investigation involving six experiments on 180 litters of pigs, the authors compared the merits of weaning baby pigs at 3, 5, or 8 weeks of age; determined the proper protein levels for pigs weaned at 3 weeks; and assessed the influence of the kind of starter on the rate and efficiency of gain of pigs during the first 8 weeks and on the rate and efficiency of gain during the final growing period in conjunction with determinations of final carcass characteristics and composition. Among the findings are the following. (1) Although pigs weaned to dry diets at an early age normally prefer diets containing sugar, dried skim milk, and/or fish meal to simplified corn-soybean meal diets, the pigs in this research that were weaned at 3 weeks did not. The authors suggest that the amount of sucrose and dried skim milk in the experimental diets may have been too small to improve the acceptability of the diets. (2) Pigs 9 weeks old and older ate larger amounts of corn-soybean meal diets containing 10 percent sucrose, 10 percent dried skim milk, and 3 percent fish meal than of the original

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 Abstracter: L. Baldwin

6.54 BENEFICIAL EFFECTS OF FISH PROTEIN CONCENTRATE
(0.4) ON THE SURVIVAL TIME OF THYROTOXIC RATS (34209)

Ershoff, Benjamin H. (Institute for Nutritional Studies, Culver City, California 90230)
Proceedings of the Society for Experimental Biology and Medicine 132, No. 1, 337-340 (October 1969)

Available data indicate that immature rats fed a low-fat purified diet with casein as the source of dietary protein (the diet contained 20 percent protein) and sucrose as the dietary carbohydrate are extremely sensitive to thyroid fed in massive doses. The sensitivity is manifested by death within 28 days, apparently the result of cardiac failure. Substituting fish protein concentrate for the casein while continuing to feed the rats similar doses of thyroid, the author reduced the incidence of mortality at the 0.25 percent thyroid level from 55.6 and 44.4 percent, respectively, for male and female rats to 0 percent for both. At the 0.5 percent thyroid level, the percent of mortality over the 28-day period was reduced from 75.0 to 20.8 for males and from 62.5 to 16.7 for females. [1 table, 22 references]

 Abstracter: L. Baldwin

6.37 A METHOD FOR MAKING MILK BEVERAGES WITH THE ADDITION OF CHLORELLA

Japanese Patent 6965/68
Nagamatsu, N., and K. Tsutiya (pat.)
Dairy Sci. Abstr. 31, No. 6, Abstr. No. 2052 (1969)
B.F.M.I.R.A. Abstracts 22, No. 9, Abstract No. 1854, 476 (September 1969)

Dried Chlorella are added to melted butter or other fats containing an emulsifier. The mixture is added to liquid dairy products.
[Extracter: F. T. Piskur]

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These results confirm observations made by several other investigators that when young pigs are fed on a free choice basis, the carry-over effect of various levels of protein on later performance is quite small. Only if feed is severely restricted at the same time that low protein diets are fed can carcass composition and later pig performance be modified. [2 tables]

6.195

was consistent. This greater feed intake resulted in faster daily gains and heavier weights at 9 weeks, regardless of the protein level sequence, but caused no better feed efficiency. The protein level sequence imposed on pigs weaned at 3 weeks did not affect gains up to 9 weeks, nor did it significantly affect the various measurements taken on carcass leanness. Moreover, the complex starter did not affect either carcass characteristics or the rate and efficiency of gain made by the pigs after the 9-week period--pigs fed either the simplified starter or the complex starter reached the same final weights at the same approximate age--those on simplified starter at 142.8 days and those on complex starter at 141.5 days.

These results confirm observations made by several other investigators that when young pigs are fed on a free choice basis, the carry-over effect of various levels of protein on later performance is quite small. Only if feed is severely restricted at the same time that low protein diets are fed can carcass composition and later pig performance be modified. [2 tables]

6.195

Every 4 weeks throughout the 12-week experimental period the hens were weighed; records of food consumption, egg production, and egg weight were kept daily.

Hens that were fed increasing levels of dietary fat or increasing levels of dietary ME maintained their body weight best. Controlling the caloric intake of the hens on the different fat treatments by regulating the ME intake did not exert a corresponding control on the hens' weight. ME intake did not affect egg size to any significant extent, although increasing the dietary ME intake resulted in a highly significant increase ($P < 0.001$) in the number of eggs laid, the response being very rapid and noticeable within the first 28 days.

Although dietary corn oil had no significant effect on the number of eggs laid over the total experimental period, it did cause a slight, insignificant increase in egg weight; the effect on egg numbers was significant ($P < 0.05$) only during the second 28-day period. The presence of corn oil in the diet resulted in a significant ($P < 0.05$) increase in the efficiency of conversion of dietary ME to eggs.

Increasing dietary cod-liver oil had no significant effect on egg production at any time during the experimental period. Nor did it have any significant influence on egg size at any time. Although it had no significant effect on the total weight of eggs laid over the entire experimental period, increasing the level produced a significant ($P < 0.05$) decrease in the total weight of eggs laid during the first two 28-day periods; it had no significant effect during the final 28 days. Dietary cod-liver oil had no significant effect on the efficiency of conversion of dietary ME to egg product, either overall or in any one period. These findings indicate that no advantage is to be gained by adding up to 2 percent cod-liver oil to the rations of laying hens.
[4 tables, 25 references]

6.39 BIOCHEMICAL STUDIES ON MARINE ALGAE-I. CATION ABSORPTION BY PLANT MATERIALS PREPARED FROM GREEN, BROWN, AND RED ALGAE

Horiguchi, Yoshishige, Akiko Tanaka, and Masato Miyake
Report of Faculty of Fisheries Prefectural University of Mie 6, No. 2, 75-85 (December 20, 1968) (Faculty of Fisheries, Prefectural University of Mie, Ootanimachi, Tsu, Mie Prefecture, Japan)

This paper reports on preliminary experiments to determine the uptake of ions (Fe^{3+}, Cu^{2+}, Ni^{2+}, Co^{2+}, and Zn^{2+}) by marine algae. Marine plant materials from 46 samples were prepared: 3 species of green algae, 19 species of brown algae, and 17 species of red algae. The authors found that the ion exchange capacities of the marine plant materials were about 0.2 to 12.0 meq. per g. on a dry basis. The ion exchange capacities of the marine plant materials prepared from the 8 species of Fucaceae for Fe^{3+} (6.1 to 12.0 meq. per g.) were higher than those of calcium alginate (5.7 meq. per g.) and Amberlite IR-120 (5.0 meq. per g.).
[4 figures, 2 tables, 8 references] [Abstracter: F. T. Piskur]

6.9 FISH BAIT

U.S. Patent 3,437,488
Humphreys, R. E.; Angler Products, Inc. (pat.)
Food Technology 23, No. 9, 46 (September 1969)

Fish bait has a gelatin base and contains hexamethylene tetramine to reduce the water solubility of the gelatin. [Abstracter: F. T. Piskur]

6.54 [THE PROCESSING OF SHARK FINS AND THEIR USES]
(1.72) (2.8)

Gordievskaya, V. S.
Rybnoe Khozyaistvo 45, No. 3, 59-61 (1969) (In Russian)
Food Science and Technology Abstracts 1, No. 9, 1178, Item 9R236 (September 1969)

To convert the frozen back and rib fins of shark into a dried, finished, or semifinished product, one should proceed as follows: (1) thaw the frozen fins, (2) wash them in a flow washer for from 1.5 to 2.5 hours at 16° to 20° C., (3) boil them from 20 to 45 min. at from 92° to 95° C., (4) cool them, (5) separate the meat from the collagen threads, (6) dry the fins for from 28 to 32 hours, and (7) press them. The final product is suitable for making gelatinous soups or soup preserves. The author describes the culinary preparation of these soup entrees. [Extracter: L. Baldwin]

6.54 PERUVIAN FIRM MAKING FPC AND USING IT IN OTHER FOODS

Philips, Richard H.
National Fisherman 50, No. 8, 7-C (November 1969)

This short article describes the manufacturing process and mentions the uses of FPC (fish protein concentrate) in Peru.

Using hake (Merluccius gayi gayi), the engineer-owner of the FPC plant converts the raw product by a method he has developed. In the first step, the water content of the fish is reduced from 75 percent to a maximum of 8 percent by heat. Then the semidehydrated fish is sealed in an extractor and a vacuum is created, which opens the pores and cells of the fish material and exposes it more fully to the hexane vapor that is used as a solvent. This vaporized solvent, which weighs 1.5 times as much as the material, removes all but <1 percent of the fat and achieves results that with a liquid solvent would require the FPC to be circulated up to 16 times. Because of the low fat content, further deodorization is not necessary, though it could be done with an alcohol wash after the milling. The product is sterilized in the extractor.

The equipment required for the process consists of a barometric column and vacuum pump, a refrigerated gas separator, a storage tank for the solvent, a collection tank for the oil, a main and an auxiliary evaporator, a solvent vapor super heater, an extractor chamber, a filter, a heat exchanger, a miscella tank, an elevator, and loading and unloading bins. The grinder and sifter used have a capacity of 700 lb./hr. To make 2,000 lb. of FPC by this process, the owner uses

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 Abstracter: L. Baldwin

7.592 (0.112) (7.89) COLOR MEASUREMENT OF FOODS: XIV. COLOR SCALES

Clydesdale, F. M., and F. J. Francis (Department of Food Science and Technology, University of Massachusetts, Amherst)
Food Product Development 3, No. 6, 117, 120, 122, 124-125 (October 1969)

In Part XII of this series, the authors described the many colorimeters that are currently being used in food research and quality control applications in America. Data from each type of instrument are usually converted to other types of measurements by the C.I.E. X Y Z system, equations with instructions for the conversion being provided by the manufacturer of each colorimeter. In 1968, Clydesdale and Podlesny published a computer program for these interconversions. Agtron has also been widely used, but no method of converting Agtron data to X Y Z has yet proved satisfactory. In addition, there are, of course, numerous graphical methods and nomographs for direct conversion of data from one system to another. All these systems are directed toward development of a more visually uniform color system or toward adaptation of calculations to electronic instruments. The authors doubt that visually uniform space can ever be completely attained; yet several new systems that offer promise for food materials have been proposed. This article traces the development of color scales and gives 35 equations used for conventional scale conversions. [4 figures, 27 references]

 Abstracter: L. Baldwin

7.51 (0.7) A CORRECTION FOR MAINTENANCE NITROGEN IN THE DETERMINATION OF NET PROTEIN UTILIZATION OF THE PROTEIN

Rao, M. Narayana (Central Food Technological Research Institute, Mysore, India)
Nutritio et Dieta 11, No. 3, 193-197 (1969) (Box 352, White Plains, New York 10602)

In determining protein quality, expressed in terms of NPU (net protein utilization) according to Miller and Bender (1955), the loss of body N in animals receiving a nitrogen-free diet is considered equivalent to the maintenance nitrogen requirements of experimental animals receiving different protein foods. Since the maintenance nitrogen requirement of fast-growing animals on a good-quality protein is not the same as the requirement for slow-growing animals on a low-quality protein, an obvious error is introduced. This error can be circumvented if the requirements are calculated on the basis of surface area and loss of body N of the animals receiving the nitrogen-free diet, for, as has been shown by several investigators, maintenance nitrogen requirements are proportional to body surface area. The author suggests that one group of experimental animals be initially sacrificed to provide the base-line values for body N, which is required for a calculation of nitrogen gained.
[1 table, 3 references]

 Abstracter: L. Baldwin

7.89 REFLECTANCE CHARACTERISTICS OF CANNED TUNA. 1. DEVELOPMENT OF AN OBJECTIVE METHOD FOR EVALUATING COLOR ON AN INDUSTRY-WIDE BASIS

Little, Angela C. (Department of Nutritional Sciences, University of California, Berkeley, California 94720)
Food Technology 23, No. 10, 71-74 (October 1969)

The present U.S. Standard of Identity for Canned Tuna (1962) defines the color requirements for white, light, and dark tuna in terms of the Munsell Value function as measured by the specific optical comparator described in the Standard. It seems that a system is needed that will provide greater precision and speed of measurement and that will be acceptable in an international code. The purpose of this study was to develop a method incorporating C.I.E. (Commission Internationale de l'Éclairage) specifications and commercially available tri-stimulus colorimeters for measuring color quality of canned tuna.

The author presents detailed instructions for preparation of the sample of canned tuna and for presentation of the sample to the reflectometer in measuring the reflectance characteristics of canned tuna. Apparently there were variations in the performance of the six various instruments used. These variations, however, could be reconciled by statistical regression analysis techniques where the performance of each instrument is compared to a selected "reference" instrument. The method described is not practical on an industry-wide basis. The problem of

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 Abstracter: F. T. Piskur

7.51 (0.7) A NEW BIOLOGICAL METHOD FOR ESTIMATING FOOD PROTEIN NUTRITIVE VALUE

Mokady, Shoshana, S. Viola, and G. Zimmermann (Department of Food and Bio-Technology, Technion, Israel Institute of Technology, Haifa, Israel)
British Journal of Nutrition 23, No. 3, 491-495 (August 1969)

The method described here is analogous to the classical method for determining net protein utilization (NPU)--the criterion, called LPU (the protein utilized by the liver), expresses the amount of food nitrogen retained in the liver as a percentage of the food nitrogen consumed. Five different protein foods were tested for LPU and NPU on 78 rats. The correlation coefficient between the two sets of values was +0.85, a highly significant coefficient.

The new method has several advantages. Values of LPU can be predicted from known values of NPU. Many analyses can be made at a time, since determinations are made with a single organ. The homogenizing procedure is very simple; moreover, it gives a much more uniform material than any whole-carcass homogenate; thus the nitrogen determinations on the liver homogenates are more representative. Microdeterminations of nitrogen in liver samples are more convenient and rapid than the classical nitrogen determinations made by the Kjeldahl method on carcass samples of much greater weight. In contrast with the shortened method proposed by Miller and Bender in 1955 (in which body N is calculated from water content), the LPU method is based on values derived directly from N determinations. Values for individual animals are easily determined, so statistical analysis of results is feasible. [1 figure, 1 table, 19 references]

[Abstracter: L. Baldwin]

7.89

variations in instrument performance could be resolved by the use of material standards that can be used to calibrate the instruments used. The author is now studying the possibility of developing material standards covering the range of reflectance of commercial canned tuna. [2 figures, 4 tables, 4 references]

7.89 MEAT QUALITY MEASUREMENT

Canadian Patent 814,144
Knudsen, E. S.; Slagteriernes Forskningsinstitut (pat.)
Food Technology 23, No. 10, 58 (October 1969)

This patent covers a method for evaluating the color characteristics of light reflected from the freshly cut surface of meat. [Abstracter: F. T. Piskur]

6.54

90 kw. of electricity, 900 lb. of steam at 70 lb. pressure, 90 gal. of water, from 10 to 14 lb. of solvent, and from 10 to 15 man hours of labor.

Presently the plant is producing 180 tons of FPC per month, but demand for the product is such that the owner is planning an expansion that will bring the capacity to over 1,000 tons a month. He markets the product in two ways: either packed in polyethylene and paper bags, in which form it brings 6.2 soles per kilogram on the local market, $240 per ton on the export market; or combined with other meals and flours, in which form it is marketed in a line of FPC-fortified soups, noodles, and cereals.

6.54 RELATION BETWEEN pH OF FISH MEAT PASTE AND THE ASHI (ELASTICITY) OF KAMABOKO

Tanaka, Akiko, Takashi Mito, and Yasuo Inoue
Journal of Faculty of Fisheries Prefectural University of Mie 7, No. 3, 271-276 (December 14, 1968) (In Japanese; summary in English)

Control of pH in fish meat jellies (kamaboko) is necessary to produce a quality product. In this study, the authors found that the optimum pH that produced the highest elasticity of kamaboko was 6.1 to 6.5 for dark-fleshed fish meat and 7.1 to 7.3 for white-fleshed fish meat. Sodium carbonate was used to adjust the pH. [4 figures, 5 references] (Text and titles of figures are in English; references are in Japanese) [Abstracter: F. T. Piskur]

7.593 STUDIES ON THE ORGANIC PHOSPHATES IN VISCERA OF AQUATIC ANIMALS--IV. AN IMPROVED METHOD FOR THE DETERMINATION OF PURINES, PYRIMIDINES, AND NUCLEOSIDES

Seki, Nobuo, Toshio Kanaya, and Tsuneyuki Saito (Laboratory of Biochemistry, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 7, 690-694 (July 1969) (In Japanese; figures, table, and summary in English)

The following method may be used for chromatographic separation and determination of purines, pyrimidines, and nucleosides. Use a Dowex 1-X2 (200-400 mesh) column with stepwise elution; wash the column with solvent A (0.2 N NH_4OH - 0.02 N HCl - 0.01 N $Na_2B_4O_7$); pour bases and nucleosides dissolved in solvent A onto the column; elute them from the resin with solvent A, then solvent B (0.15 N NH_4OH - 0.03 N HCl - 0.01 N $Na_2B_4O_7$), and then solvent C (0.05 N NH_4OH - 0.04 N HCl - 0.01 N $Na_2B_4O_7$). The sequence of elution will be nicotinamide + cytosine, uracil, cytidine, adenosine, guanine, hypoxanthine + uridine, adenine, guanosine, and inosine. Since xanthine and hypoxanthine overlap, and since uric acid is labile in the alkaline solvents, use a formic acid system on Dowex 1-X8 to separate them. This improved method can be used to study nucleotide catabolism in the tissues. [5 figures, 1 table, 3 references] [Abstracter: L. Baldwin]

7.9 (2.05) FLUORESCENT ANTIBODY TECHNIQUES FOR SALMONELLA AND OTHER ENTERIC PATHOGENS

Cherry, William B., and Berenice M. Thomason (Laboratory Division of the National Communicable Disease Center, Health Services and Mental Health Administration, Public Health Service, Atlanta, Georgia 30333)
Public Health Reports 84, No. 10, 887-898 (October 1969)

The authors' objective was to clarify the status of immunofluorescence tests for detection of Salmonella, Shigella, and enteropathogenic Escherichia coli in clinical specimens and foodstuffs, for, among enteric bacteria, these genera are important incitants of human infections.

Results of efforts to detect salmonellae in foods, feeds, and raw materials indicate that conjugates prepared from OH sera may be useful in screening selective enrichment media for the pathogen. One difficulty in the use of conjugates for Shigella is the investigators' inability to isolate S. flexneri from many of the specimens positive for fluorescent antibodies (FAs). Whether the difficulty is due to false positive FA reactions or to the inadequacy of the isolation procedures has not been resolved. The S. sonnei reagent is both specific and sensitive. The authors say that additional information is needed before specific recommendations can be made in this area. However, reliable FA tests have been developed for detecting Salmonella typhi and enteropathogenic Escherichia coli. These latter have proved to be from 10 to 100 times more sensitive than cultural procedures. [1 figure, 2 tables, 37 references]

 Abstracter: L. Baldwin

8.59 STUDIES ON FISH MUSCLE PROTEASE--I. ON THE EXISTENCE OF TWO KINDS OF PROTEINASE ACTIVE IN ACID AND IN SLIGHTLY ALKALINE pH RANGE

Makinodan, Yasuo, and Shizunori Ikeda (Dept. Fish., Fac. Agr., Kyoto Univ., Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 7, 672-676 (July 1969)

Muscle proteinase was investigated in carp (Cyprinus carpio), albacore (Thunnus alalunga), frigate mackerel (Auxis tapeinosoma), common mackerel (Scomber japonicus), sardine (Sardinops melamosticta), yellowtail (Seriola quinqueradiata), horse mackerel (Trachurus japonicus), cod (Gadus macrocephalus), red sea bream (Pagrus major), barracuda (Sphyraena pinguis), lizard fish (Saurida undosquamis), and white croaker (Argyrosomus argentatus). Two kinds of proteinases in the muscle were confirmed: one acting in the acid pH range and the other in a slightly alkaline pH range. The former was found in all the fish investigated; the latter was found in all the white-meat fish except the cod, its activity being very low or nonexistent in red- and slightly red-meat fish, such as albacore, frigate mackerel, common mackerel, sardine, yellowtail, and horse mackerel.
[4 figures, 2 tables, 19 references]

 Abstracter: L. Baldwin

8.0 [POLYUNSATURATED FATTY ACID CONTENT OF FAT OF SOME ATLANTIC AND INDIAN OCEAN FISH]

Khristoferzen, G. S. (Azovsko-Chernomorskii Nauchno-issled. Inst. Morskogo Rybnogo Khozyaistva i Okeanografii, Kerch', U.S.S.R.)
Voprosy Pitaniya 28, No. 3, 86-87 (1969) (In Russian)
Food Science and Technology Abstracts 1, No. 9, 1177-1178, Item 9R 232 (September 1969)

The author determined the polyunsaturated fatty acid content and the saponification, iodine, and peroxide values of the fat of several commercial fishes. Some of the values, determined on frozen fish, are tabulated on back of card.
[2 references]

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 Extracter: L. Baldwin

8.8 RELATIONSHIP OF SIZE AND BODY AREA TO THE FLAVOR AND AROMA IN FISH

Baldwin, Ruth E., and Kay Gonnerman Sides (Department of Food Science and Nutrition, University of Missouri, Columbia 65201) and John W. Robinson (Missouri Department of Conservation, Jefferson City, Mo. 65101)
Transactions of the American Fisheries Society 98, No. 3, 533-537 (July 1969)

The authors tested carp (Cyprinus carpio, Linnaeus), flathead catfish (Pylodictus olivaris, Rafinesque), and fresh-water drum (Aplodinotus grunniens, Rafinesque) to determine if the flavor or aroma of the edible flesh taken from one position differed from that taken from another among specimens of different weight and sex. Experienced taste panelists, judging on an 8-point scale, found significant differences in main effects for flavor and aroma of carp and flavor of catfish due to locations of sample and weight of fish. Interaction between judges and position of sample for the flavor of drum was significant; however, the interaction for the aroma of drum was not significant, though the main effect for position for aroma was significant. The panelists showed a preference for the flavor and aroma of samples from the posterior position of drum, for the flavor and aroma of medium or heavy (rather than light) carp, and for the flavor of small catfish.

From these findings, the authors conclude that during research on flavor and aroma of fish, the weight and sex of the fish should be specified. Except

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 Abstracter: L. Baldwin

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Fish	Percent fat in flesh	Content of enoic acids (% of total fat)				
		Di-	Tri-	Tetra-	Penta-	Hexa-
Scomber colias	12	6.0	9.1	8.6	6.5	4.2
Sardinius ocellatus	9.2	4.7	4.7	10.7	17.1	5.2
Trachurus trachurus	4.5	5.0	7.1	8.7	6.9	5.5
Umbrina cirrosa	3.5	9.3	6.9	5.9	4.7	3.9
Tunny (white flesh)	0.6	2.3	8.7	8.5	6.3	5.9
(dark flesh)	1.1	3.3	9.0	7.2	5.0	6.8
Iohnius osseus	1.1	3.7	7.7	7.0	5.3	5.5
Rachycentron canadum	2.0	3.7	6.9	6.3	4.6	4.7
Pampus argentus	4.6	3.4	4.8	3.6	2.6	4.2
Recapterus kiliche	1.2	5.5	9.3	7.4	5.2	4.2
Scomber japonicus	3.8	5.9	5.6	4.8	2.9	4.1
Arius goniaspis	1.1	2.9	1.4	3.4	2.1	4.0
Cubiceps natalensis	8.8	5.8	7.6	5.6	2.5	3.3
Albula vulpes	1.5	5.0	7.8	7.5	5.6	5.5
Siganus oramin	1.2	6.7	8.1	9.4	6.0	3.9
Caranx melanipuges	1.0	6.0	4.8	6.7	8.8	9.8

8.8

for samples from male carp, those from any position in the edible flesh can be considered representative. This exception suggests that positional difference in flavor and aroma as these attributes relate to sex and species should be studied further. The factors that may influence the disposition of flavor and aroma as fish increase in size are unknown. Because flavor and aroma differences between small and very large fish vary with species, the composition of fish of different weights within species may differ. Since characteristic flavors of species in red meats have been shown to be carried in the fat, changes in fat content in relation to size and species could be related to flavor and aroma characteristics of fish. [2 figures, 3 tables, 5 references]

8.42 WATER SOLUBLE ARSENO-ORGANIC COMPOUNDS IN MARINE FISHES

Lunde, Gulbrand (Central Institute for Industrial Research, Oslo 3, Norway)
Nature 224, No. 5215, 186-187 (October 11, 1969)

This study has shown that arsenic is present in the N-liquor (the water soluble phase of boiled fish) chiefly as one or more arseno-organic compounds in which the organic arsenic does not exchange with the inorganic arsenic.
[1 table, 5 references] [Abstracter: F. T. Piskur]

8.51 (1.89) STUDIES ON THE WATER-SOLUBLE PROTEINS OF THE SQUID MUSCLE--I. A COMPARATIVE STUDY OF THE MANTLE AND THE ARM MUSCLE PROTEINS

Katsumi, Seeko, and Juichiro J. Matsumoto (Department of Chemistry, Sophia University, Chiyoda-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 7, 685-689 (July 1969)

The protein composition of the water-soluble fraction of the mantle and arm muscles of squid (Ommastrephes sloani pacificus) was analyzed and the aqueous extracts of the two kinds of muscle were compared. Extracts of the arms showed a marked streaming-birefringence, whereas those of the mantle did not. Electrophoretic analysis showed that both types of extract gave patterns consisting of three components. The values of the electrophoretic mobility suggest that the slowest two components of the arms correspond to the fastest two of the mantle; the fastest component accounts for the streaming-birefringence in the arm. Keeping the muscles in frozen storage caused the mobility values of the components to increase slightly. The nature of the streaming-birefringent protein is discussed, and reasons are given for assumptions that the substance in the arm muscle is different from the actomyosinlike protein that constitutes the contractile structure of the muscle. [1 figure, 4 tables, 14 references] [Abstracter: L. Baldwin]

8.8 (3.3) (1.3) RELATION BETWEEN THE QUALITY OF CANNED FISH AND ITS CONTENT OF ATP-BREAKDOWNS--II. ATP-BREAKDOWNS IN RAW MEAT OF RED AND PINK SALMON IN RELATIONS TO THEIR INSPECTION SCORES AFTER CANNING

Fujii, Yutaka (Tokai Reg. Fish. Res. Lab., Chuo-ku, Tokyo, Japan), Yoshitaka Hirose (Nichiro Fish. Co. Ltd., Chiyoda-ku, Tokyo), Hisashi Tezuka, and Eizaburo Noguchi
Bulletin of the Japanese Society of Scientific Fisheries 35, No. 7, 665-671 (July 1969) (In Japanese; figures, tables, and summary in English)

This paper examines the relation between the quality of canned red salmon (Oncorhynchus nerka) and pink salmon (O. gorbuscha) and the freshness of the fish before they were canned. As indices of freshness, the ratio of IMP (inosine monophosphate), HxR (hypoxanthine ribose), and Hx (hypoxanthine) to a total entity composed of the three was adopted. The quality of the canned samples was graded by examination of the odor emitted from the opened can and by the appearance of the oil at the top of the can.

The decrease of IMP that accompanied the accumulation of HxR and Hx was taken as evidence of the deterioration of the raw material. The difference in degradation rates of IMP in the different species was assumed to be caused by the difference in their deteriorating enzymes. The degradation curves of IMP for raw fish paralleled that of the canned fish; the IMP ratios in the raw fish correlated well with the inspection scores given the canned fish.
[11 figures, 1 table, 14 references] [Abstracter: L. Baldwin]

9.12 SCHOOLING OF FISHES RELATIVE TO AVAILABLE LIGHT

Whitney, Richard R. (Fishery Oceanography Center, Bureau of Commercial Fisheries, La Jolla, California)
Transactions of the American Fisheries Society 98, No. 3, 497-504 (July 1969)

It has been fairly well established that vision is of primary importance in the maintenance of most fish schools. Although numerous laboratory studies have shown that fish do not remain in schools if light is sufficiently reduced, field observations have shown that fish can and sometimes do maintain schools at night. In this paper, the author attempted to determine how light intensity in nature affects the schooling behavior of fish. A knowledge of what the light intensities are in water at different times of the day and at different depths and of how they relate to the schooling ability of fishes was used to plot curves that indicate the maximum depth of the fish schools. In the article, the author showed that such sources of light as moonlight, starlight, skylight, and luminescent organisms are often sufficient means of visual orientation for fish to maintain their schools. Thus, he concludes that vision at night, just as in the day, is the primary sense used by fish in maintaining schools.
[2 figures, 29 references]

 Abstracter: L. Baldwin

9.13 (1.35) STUDIES ON THE OSMOREGULATION OF THE CHUM SALMON, ONCORHYNCHUS KETA (WALBAUM) - I. THE TOLERANCE OF EYED PERIOD EGGS, ALEVINS AND FRY OF THE CHUM SALMON TO SEA WATER

Kashiwagi, Masaaki, and Ryuhei Sato (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 20, No. 1, 41-47 (March 1969)

That the fry of chum salmon prefer sea water to fresh water has been demonstrated. But whether the ability of the fry to tolerate environmental change develops gradually through the alevin and fry periods or whether it appears as a sudden conversion before the salmon's seaward migration is unknown. Therefore the authors undertook to determine the degree of tolerance of different stages of the chum to different concentrations of sea water. The findings are tabulated on the back of the card. [6 figures, 1 table, 9 references]

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 Abstracter: L. Baldwin

9.14 (9.16) AUTOMATIC LIVE BRINE SHRIMP FEEDER

Benoit, Duane, Roll Syrett, and John Hale (USDI, Federal Water Pollution Control Administration, National Water Quality Laboratory, Duluth, Minnesota 55804)
Transactions of the American Fisheries Society 98, No. 3, 532-533 (July 1969)

Brine shrimp are highly satisfactory as food for a great number of fishes, particularly those in the early stages of feeding. Described here is an automatic feeder that is independent of electrical systems and is simple to operate and maintain, yet it continuously supplies live shrimp to the fish fry. The system operates from a constant-flow siphon, the rate of brine dripping from the siphon into a fish hatchery jar being controlled by a screw clamp on the constant-flow outlet; the number of feedings per day, then, is governed by the rate of drip, for when the brine in the jar reaches the top of a U-tube inverted over the edge of the jar, a quantity of shrimp will be siphoned into a fry tank beneath the lower end of the U-tube. The U-tube siphoning will stop when the brine in the jar returns to the previous level. The amount of shrimp siphoned during each cycle depends on the concentration of shrimp and the depth of the U-tube in the jar.

The authors have used the feeder successfully to feed lake herring (Coregonis artedii, Le Sueur), round whitefish (Prosopium cylindraceum, Pallas), smallmouth bass (Micropterus dolomieui, Lacépède), northern pike (Esox lucius, Linnaeus), and white sucker (Catostomus commersoni, Lacépède). They say it can be used to feed other plankton organisms besides brine shrimp automatically. [1 figure, 3 references]

 Abstracter: L. Baldwin

9.16 CATFISH FARMING - IT HAS POTENTIAL, PROFITS, PROBLEMS

Milburn, Gary (National Marketing Services Office, U.S. Bureau of Commercial Fisheries, 100 East Ohio Street., Room 526, Chicago, Illinois 60611)
National Fisherman 50, No. 8, 1-C, 9-C, 23-C (November 1969)

Catfish farming can be very profitable. The fish are extremely efficient in converting feed into salable meat, about 1.8 lb. of food being enough to produce a pound of catfish. Even the poultry industry, which is considered very efficient, cannot compete with such returns. Moreover, catfish are worth more per pound than any other meat product. In addition, the land given over to catfish production yields profits equal to or exceeding those from the crops traditionally grown on the land. The labor costs of operating a catfish farm are low--except during harvesting, two men can do all the work required to run a 500- or 1,000-acre catfish farm.

But the profits can be overshadowed by the problems. Some farmers who have tried to convert worn-out cropland into ponds for raising catfish have found that the pesticides and herbicides used over the years on the crops are toxic to the fish. Some have found that they cannot prevent wind-blown chemicals used to dust nearby crops from killing their fish. Diseases, parasites, and oxygen depletion necessitate unflagging attention to the biological environment. Capital investment requirements are so high (the fixed investment may run as high as $1,000 an acre) that only operators of considerable net worth and credit rating are likely

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 Abstracter: L. Baldwin

9.13

Salmon stage	Age	Survival in				
		Fresh water	Sea-water:Fresh-water Mix			
			1:4	1:1	3:4	1:0
	days	percent	percent			
Eggs	[eyed]	100	10	0	0	0
Alevins	1	100	95	0	0	0
	10	100	100	85	0	0
	20	100	100	90	80	0
	40	100	100	100	80	0
Fry	60	100	100	100	100	85
	90	100	100	100	100	100
	120	100	-	100	-	100

9.16

to be in a position to obtain financing adequate for the enterprise. Imports from areas where labor, construction, and transportation costs are low may create unbearable competition. As a case in point, United Fruit has decided to begin a pilot operation in Honduras. Production costs in such areas are unquestionably less than 20¢ per pound, and some processors are already finding resistance to current prices. Finally, such problems as the image of catfish as a menu item and the technical intricacies of growing, harvesting, and processing are yet to be solved.

However, the potential is there. Federal, state, and private agencies are devoting appreciable amounts of research effort and resources to solving the technical, biological, economic, and marketing problems. Among the developments expected to generate a greater demand for the product--as well as to improve the returns from the product--are increases in sales to institutions; introduction of the product into supermarkets; establishment (and popular acceptance) of specialized catfish restaurants; reduction of the costs of production so that prices can be more competitive; success of promotion activities directed toward attracting new users; creation of new products with catfish as a base; genetic breeding for faster-growing, meatier fish; and development of better mechanical and automated production and processing techniques. [4 photographs]

9.12 (9.3) VARIATIONS IN THE PLASMA PROTEINS OF ATLANTIC SALMON (SALMO SALAR L.)

McKenzie, J. A., and U. Paim (Department of Biology, University of New Brunswick, Fredericton, New Brunswick)
Canadian Journal of Zoology 47, No. 5, 759-761 (September 1969)

In 1967, Wright and Hasler successfully used serum protein electrophoresis to identify individual populations of white bass inhabiting the same lake. In 1965, Sick showed that polymorphisms in the plasma protein of fish may be genetically controlled, and individual populations can be characterized by their gene frequencies. The present authors studied the plasma proteins of 51 hatchery-reared Atlantic salmon to find out if there were polymorphisms. They found eight distinct phenotypes among the fish, which were all reared in the same trough under identical environmental conditions. The authors speculate that the frequency of the blood plasma polymorphisms may vary in a way to reflect sexual isolation. If so, they would serve to identify populations on their migration routes, and, possibly, to answer the question posed by Saunders in 1967 about whether the salmon that enter their native rivers in the spring and fall are genetically distinct populations or whether these seasonal runs are determined by the environment. [2 figures, 9 references] [Abstracter: L. Baldwin]

9.15 SUGGESTED PROGRAMME TO CONTAIN CROWN-OF-THORN STARFISH PLAGUE

Anonymous
Australian Fisheries 28, No. 9, 16-17 (September 1969)

In a report to the Queensland Government, Dr. R. Endean, project leader of a team commissioned to recommend a program for containing the crown-of-thorns starfish (Acanthaster planei) that are devasting areas of the Great Barrier Reefs, made the following suggestions. (1) Collectors, both voluntary and paid, should be used to gather crown-of-thorns starfish from the infested areas. A set schedule of collection was recommended, by geographical area. (2) Three scientists, two technicians, and two assistants should be employed to direct and coordinate the program and to obtain additional data on the infestation and on the general biology of the giant triton (Charonia tritonis), the only known predator of adult crown-of-thorns starfish. (3) Giant tritons imported from areas outside Australia (Sabah, The Philippines, and Taiwan) should be used to restock selected reefs and to serve as the basis of a massive triton-breeding effort. (4) The collection of giant tritons, shells, and giant helmets (Cassis cornata, a possible starfish predator) should be banned or restricted, and the restrictions should be rigidly enforced. Since only the outer reefs, near the 100-fathom contour, have escaped infestation, it has been assumed that collectors' taking of large numbers of the starfish's natural enemies from the more accessible areas accounts for the heavy starfish incursions there.

Implementation of these suggestions was estimated to cost about $250,000 a year for the first 2 years and about half that thereafter. [2 photographs]

[Abstracter: L. Baldwin]

9.13 HEMOLYMPH PROTEINS OF THE BLUE CRAB, CALLINECTES SAPIDUS. (1.86)
II. A LIPOPROTEIN SEROLOGICALLY IDENTICAL TO OOCYTE LIPOVITELLIN

Kerr, Marilyn S. (Biol. Div., Oak Ridge Nat. Lab., Oak Ridge, Tennessee)
Chemical Abstracts 71, No. 13, 58173r (September 29, 1969)

9.16 RESEARCH REPORTS - OTHER
(9.13)

Anonymous
Feedstuffs 41, No. 46, 36 (November 15, 1969)

Volume 13, No. 1 of Louisiana Agriculture (published by Louisiana State University Agricultural Experiment Station, Baton Rouge) contains the results of two sets of experiments run to test the tolerance of catfish to salt water.

Catfish feeding.--Over the past 2 years, fingerlings of blue, channel, and white catfish have been stocked separately at a rate of 2,000 per acre (in 1967) or 2,500 per acre (in 1968) in brackish ponds to determine their growth, survival, and food conversion. All were obtained from fresh water. All were fed a daily diet amounting to about 3 percent of their body weight. Salinity in the ponds ranged from 1.8‰ to 11.2‰. The ponds were seined every 2 weeks so fish growth could be checked and feeding rates adjusted; in winter, they were drained and the fish were counted and weighed. The results of both years' experiments agreed very closely--channel catfish grew best, white catfish next, and blue catfish poorest; survival was 93.2 percent and food conversion was 2.1. A pond containing channel catfish produced the best yield, almost 1 ton per acre. The fish in ponds stocked at 2,000 per acre grew slightly larger than did the fish in ponds stocked at 2,500 per acre.

Catfish tests.--Laboratory tests were run on eggs, fry, fingerlings, and 1-year-old fish to determine the highest salinity tolerable. Results showed that once the egg membrane became water hardened, the egg's tolerance to salinity

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Abstracter: L. Baldwin

9.2 THE ECONOMICS OF QUAHOG DEPURATION
(1.82)

Holmsen, Andreas, and Joseph Stanislao (Departments of Food and Resources Economics and Industrial Engineering, University of Rhode Island, Kingston)
Agricultural Experiment Station Bulletin 384, 36 pp. (n.d.) (University of Rhode Island, Kingston)

The health hazard caused by the increasing pollution of the coastal waters of the United States has resulted in the closing of many shellfishing areas. The use of ultraviolet light to purify hard-shell clams taken from polluted waters has proven successful in the laboratory, but no plant has yet been designed to utilize this method. This study deals with the technical and economic aspects of depuration, including design of a processing plant and its equipment and comparison of the economic feasibility of this method with that of the present method--transplanting the clams from polluted to clean waters.

The cost of depuration (exclusive of other processing) by the use of ultraviolet light for a plant with a capacity of 105,000 bushels of quahogs per year (Rhode Island's estimated annual yield in moderately polluted waters) was determined to be 25.4 cents per bushel. The cost of the present method of purification, transplanting the quahogs from polluted to clean waters, depends on several factors--for example, the price level for quahogs, the rate of retrieval, and the amount of time required for retrieval. This cost will most likely fall within

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Abstracter: D. R. Alexander

9.16 HIGHLANDS LOBSTER FARM IN OPERATION
(1.87)

Mundey, G. R.
World Fishing 18, No. 9, 38-39 (September 1969)

At Kinlochbervie, some 20 miles south of Cape Wrath, on the northwest coast of Sutherland, Scotland, a unique lobster farm has been started. Presently its operations are divided into two parts: the purchase and capture of market-sized lobsters for keeping and feeding till market prices are favorable; and the holding of berried females till the eggs hatch, and then the rearing of the young to market size. The first part of the operation has several economic aspects. It provides experience and income to the owner while the second part is developing, and it provides a steady market at higher prices than are normally paid by professional buyers for local lobstermen.

Stocks for the farm are caught almost entirely by creeling, although the farm's staff are all divers. East Coast creels, made up in fleets of 10, are set in 5 fathoms or less, close to the rugged coastline, in locations determined by the weather forecast. Floating line used between the pots helps prevent losses. One of the ideas being tried is a lobster trap designed by the owner of the farm. Its object is to try to eliminate the interruptions in creeling imposed by bad weather, as well as the loss of creels during bad storms. The traps can catch and keep a number of lobsters for some time, being designed to keep fighting and damage to a minimum. They remain on the bottom all the time, continuing to fish

(over)

Abstracter: L. Baldwin

9.2 THE SKIPJACK TUNA INDUSTRY IN HAWAII: SOME ECONOMIC ASPECTS
(1.125)

Shang, Yung Cheng (Economic Research Center, University of Hawaii, Honolulu)
Economic Research Center Publication, 58 pp. (July 1969) (University of Hawaii, Honolulu)

The Hawaiian commercial fishing industry has not grown as fast as have other sectors of the economy. The average annual production of skipjack tuna, which constitutes the largest part of the commercial fish catch, has remained relatively stable. The study attempts to isolate the factors responsible for the lack of more rapid growth of the industry and to evaluate the probable future of the industry.

Alternative hypotheses for the lack of growth are considered: (1) overfishing due to the common property nature of the resource and (2) low profits due to low prices of fish relative to input costs. Available evidence suggests that overfishing is not the cause of the lack of more rapid growth. Cost-revenue analysis, however, indicates that profit margins in the past have been too low, both in absolute terms and in terms relative to profits in other industries, to induce new investment.

The recently initiated State loan program and the higher ex-vessel prices that have prevailed during the last few years hold some promise for the future of the industry. If the present tuna and input prices prevail, some future growth might be forthcoming. Input prices, however, are likely to rise in the

(over)

Abstracter: D. R. Alexander

9.16

during the worst weather. They are not connected to the surface, so drag is eliminated. These traps are serviced entirely by divers and, except when they are moved to a better ground, remain in postion without interruption.

Once lobsters are caught, they are banded, transferred to storage and feeding cages, and, still banded, fed copiously by divers till market conditions dictate their sale. The feeding cages are anchored to the bottom in a sheltered corner of the sea loch at sufficient depth to ensure that they are below any possible fresh-water contamination brought on by floods. Immature lobsters, of course, are kept longest. Berried females are stored separately till their eggs mature. The system has proved so successful that the owner can pay 10s a pound to local creel fishermen and still make a profit.

Nevertheless, the owner's main object is to breed rather than simply to fatten lobsters. In the process, he hopes to dispel some of the currently held theories about lobster breeding. For instance, a widely held theory is that it takes a lobster about 7 years to reach market size. If so, then rearing from the egg is uneconomic. But the owner of the Kinlochbervie farm believes that lobsters will mature much faster if given proper housing (that is, if they are not raised in shore-based tanks) and feeding. Moreover, he intends to release many of the small lobsters produced at each hatching into the open sea, where they will increase the wild stock in the area and thus make the farm self-supporting as well as be of benefit to the commercial lobstermen in the area.
[7 photographs]

9.17 (9.6)

THE FRAIL OCEAN

Marx, Wesley

National Fisherman (Supplement) 50, No. 8, 3-S (November 1969)

This 256-page book (n.d.) shows many specific ways in which the ocean is changing. It suggests that the chief cause is man's use and misuse of this, his greatest single resource, and includes suggestions about the kind of widespread and drastic measures that will have to be executed if the resource is not to be wasted. It is available from International Marine Publishing Company, 21 Elm Street, Camden, Maine 04843 for $6.95. [photographs] [Abstracter: L. Baldwin]

9.2

future. This increase could be offset by increased productivity. Any substantial increase in productivity will in turn affect the price of tuna. The magnitude of the effect will depend on the potential of various markets.

The potential of the local fresh fish market appears to be limited. Supplying the west coast cannery market is not feasible because of high shipping costs. The substitution of local catches for imports of frozen tuna for the local cannery and the export of canned tuna to mainland markets appear to be the alternatives. However, even higher (currently prevailing) cannery prices and the use of the State loan program will not make investment in a fishing vessel even marginally profitable.
[6 figures, 13 tables, 30 references]

9.17

AQUATIC WEEDS

Holm, L. G. (College of Agriculture, University of Wisconsin, Madison), L. W. Weldon, and R. D. Blackburn (Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, Fort Lauderdale, Florida)

Science 166, No. 3906, 699-709 (November 7, 1969)

Many of the watercourses of Asia, Africa, and the United States are now so fertile and so well innoculated with aquatic weeds that they can no longer correct themselves. Human activity and neglect have driven the equation of the balance of nature far to the right. By the combinations of mechanical, biological, and chemical methods of aquatic weed control we can help with the restoration of the streams and lakes. By these means, we can buy the time needed to learn to manage not only the vegetation but also each of the resources in an entire watershed.
[10 illustrations, 29 references]

[Abstracter: F. T. Piskur]

9.2

the range of $1.40 to $4.00 per bushel; under present-day conditions, it has been estimated at about $1.85 per bushel. The benefits some people derive from harvesting quahogs not grown under a transplant program have not been considered. However, even if 100 percent of the quahogs retrieved were purified under the transplanting operation, the cost of the program would be 70 cents per bushel for labor and boat expenses. Thus, according to the results of this study, depuration of quahogs by use of ultraviolet light is economically superior to the present method of transplanting.
[9 figures, 10 groups of tabular material, 3 references]

9.6

FISHERIES HYDROGRAPHY

Hela, Ilmo, and Taivo Laetastu

National Fisherman (Supplement) 50, No. 8, 4-S (November 1969)

This 137-page book (n.d.) systematically summarizes the existing knowledge of the relation between fishes and their environment. It shows ways of applying this knowledge to fishing operations for greater safety and income. It is available from International Marine Publishing Company, 21 Elm Street, Camden, Maine 04843 for $8.50. [69 photographs and drawings] [Abstracter: L. Baldwin]

9.16

increased. Eggs spawned in fresh water by channel catfish developed normally in water having a salinity of as much as 14‰. The fry and fingerlings would grow in salinities of 8‰ or 9‰, older fish in salinities of up to 11‰. The upper limits of tolerance were 11‰ for channel catfish, 12‰ for blue catfish, and 13‰ for white catfish. Within these limits, the rate of growth, survival, and food conversion of catfish grown in brackish water is similar to that of catfish grown in fresh water. Fingerlings can be transferred directly from fresh water to brackish water, but if the salinity of the new environment is as high as 11‰, they should be kept for several weeks in ponds of lower salinity so their systems can become acclimated gradually.

9.2 (1.80) DEMAND FOR SHELLFISH IN THE UNITED STATES

Suttor, Richard E., and Parviz Aryan-Nejad (Department of Agricultural Economics, University of Maryland, College Park)
Miscellaneous Publication 695, 28 pp. (July 1969) (Agricultural Experiment Station, University of Maryland, College Park)

The study estimates the linear demand functions for each of the six species of shellfish--clams, crabs, lobsters, oysters, scallops, and shrimp--that account for nearly all commercial landings and consumption of shellfish in the United States. Annual time series on prices, consumption, and income for the 1948-65 period were used. The analyses indicate that the income elasticity for fresh and frozen shellfish is approximately one (this value is substantiated by cross-section analysis). The income elasticities for lobsters and shrimp are probably greater than one and may well be greater than two. The income elasticity for crabs is about one, whereas the elasticity for scallops, though positive, is less than one. Oysters may have a negative income elasticity.

Demand for most shellfish commodities is inelastic with respect to price. Lobsters and shrimp exhibit the most inelastic demand, followed by scallops and oysters. The demand for clams is elastic.
[6 figures, 1 table, 5 references]

 Abstracter: D. R. Alexander

9.6 THE ENCYCLOPEDIA OF MARINE RESOURCES

Firth, Frank E. (editor) (New England Marine Resources Information Program, University of Rhode Island, Kingston)
Van Nostrand Reinhold Company, 450 West 33rd Street, New York, N.Y. 10001. xi + 740 pp. (1969) $25.00

This work was designed to meet the steadily growing need for accurate and detailed information about the resources of the sea. It covers alphabetically more than 125 topics of vital current interest ranging from abalones to zooplankton, spotlighting all the important minerals and biodynamics of sea life that make up man's largest reserve of food, fresh water, heat and power, and other requisites. It describes all major food-production and food-processing efforts, stressing such modern techniques as the use of electronic gear and equipment and shipboard irradiation, freezing, and breading. It examines the effects of pollution on marine life and probes particularly into the consequences of using pesticides and discharging radioactive wastes into the sea. Over 150 qualified authorities from some 20 nations have contributed to the work. The result is a mammoth reference of interest to anyone concerned with the commercial and technological possibilities of the oceans--biologists, chemists, oceanographers, fishery engineers, food technologists, fishermen, and students of marine science. The book contains a 10-page index.

 Abstracter: L. Baldwin

9.6 BOOKS RECEIVED

Anonymous
Oceans 2, No. 1, 81 (July 1969)

Bloom, Sandra C., and Stanley E. Degler
Pesticides and Pollution, 99 pp., BNA's Environmental Management Series. (Bureau of National Affairs, Inc.: Washington, D.C. [1969]). $4.00

Degler, Stanley E.
State Air Pollution Control Laws, 86 pp., BNA's Environmental Management Series. (Bureau of National Affairs, Inc.; Washington, D.C. [1969]). $4.00

Carlisle, Norman
Riches of the Sea: The New Science of Oceanology, 128 pp., illus. (Sterling Publishing Co., Inc.: New York [1967]). $4.95, Advances in Science Series.

Degler, Stanley E. (ed.)
Oil Pollution: Problems and Policies, 142 pp., BNA's Environmental Management Series. (Bureau of National Affairs, Inc.: Washington, D.C. [1969]). $4.00

Degler, Stanley E., and Sandra C. Bloom
Federal Pollution Control Programs: Water, Air, and Solid Wastes, 111 pp.,

(over)

 Abstracter: F. T. Piskur

9.6 FAO DOCUMENTATION CENTER

Anonymous
Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla 00100, Rome, Italy (1968).

The FAO Documentation Center was established in 1967 to supply scientific and technical information on food and agriculture through the use of modern methods of information storage, retrieval and dissemination. FAO has collected since 1945 considerable valuable information in the fields of agriculture, forestry, fisheries, nutrition, rural economics, and sociology. The Center now selects, analyzes, and indexes FAO publications and documents. The following services are now offered:

1. Current Awareness Service.--The monthly bulletin "FAO Documentation - Current Index" contains lists, abstracts, and indexes of publications and documents just issued. Free.

2. Retrieval Services.--These are special indexes covering all FAO subject-matter fields for the period 1945-66. Issues are announced in the "Current Index." The "Fisheries Index (1945-66) is available. It contains 432 pages and the price is $5.00.

3. Question and Answer Service.--FAO prepares replies to questions on special topics by providing ad hoc bibliographies and related FAO publications and documents. FAO charges for this service.

 Abstracter: F. T. Piskur

9.6

BNA's Environmental Management Series. (Bureau of National Affairs, Inc.: Washington, D.C. [1969]). $4.00

Wagstaffe, Reginald, and J. Havelock Fidler (ed.)
The Preservation of Natural History Specimens, Vol. 2: Zoology--Vertebrates, Botany, Geology, 404 pp., illus. (Philosophical Library: New York [1968]). $17.50

9.6 DEALING WITH WASTE PROBLEMS
(0.6)

Anonymous
Waste Management, Treatment, and Disposal for the Food Processing Industry (n.d.) Published by The Pennsylvania State University, College of Agriculture, Cooperative Extension Service, 204 Agricultural Engineering Building, University Park, Pennsylvania 16802. Free.
Food Technology 23, No. 9, 80 (September 1969)

The bulletin describes briefly the methods of waste prevention, treatment, and disposal, and waste product utilization. It contains information designed to aid food industry executives in recognizing waste problems.

[Abstracter: F. T. Piskur]

9.6 ASHRAE GUIDE AND DATA BOOK
(3.231)
Anonymous
Published by the American Society of Heating, Refrigerating and Air Conditioning Engineers, 345 E. 47th Street, New York, N.Y. 10017. (n.d.) Price $30.00.
Food Technology 23, No. 9, 84 (September 1969)

The 1969 Equipment volume of ASHRAE Guide and Data Book is the first revision of a three-volume series. The volume, along with the "ASHRAE Handbook of Fundamentals," provides a comprehensive treatment of current practices in heating, refrigeration, ventilating, and air conditioning. [Abstracter: F. T. Piskur]

9.6 THE SALT WATER AQUARIUM MANUAL
(0.119)

Valenti, Robert J.
The Salt Water Aquarium Manual, 162 pp., profusely illustrated (Aquarium Stock Company: New York [1968]). $6.95
Reviewed by J. C. Fraser
California Fish and Game 55, No. 3, 256 (July 1969)

Although this book was designed primarily as a basic reference and guide for beginning salt-water aquarists, researchers who occasionally need to hold salt-water fish for experimental purposes will find it useful. In contrast with the supercleam aquaria usually recommended, the author emphasizes a natural environment, including the presence of algae and bacteria. Not only does he explore the basic considerations involved in the selection and establishment of a marine aquarium, he explains why he makes given suggestions and how the aquarist can avoid common adversities. His sections on water chemistry, light, temperature, and filtration are good and easily understood. [Abstracter: L. Baldwin]

9.3 INTERNATIONAL PRACTICE REGARDING TRADITIONAL FISHING PRIVILEGES OF FOREIGN FISHERMEN IN ZONES OF EXTENDED MARITIME JURISDICTION

Windley, David W. (U.S. Department of the Interior, Bureau of Commercial Fisheries)
The American Journal of International Law 63, No. 3, 490-504 (July 1969) (The American Society of International Law, 2223 Masachusetts Avenue, NW., Washington 6, D.C.)

In recent years, many nations have made claims of extended maritime jurisdiction or exclusive control for various purposes, and sometimes they have claimed sovereignty over areas of sea far beyond the 3-mile territorial sea claimed by many nations. Unilateral claims of exclusive control over fishing in waters beyond 3 miles have subjected fisheries in international waters to the exclusive control of coastal states. Governments with fishermen thus subjected to foreign control have claimed various considerations. Treaties have been negotiated on the rights of displaced fishermen, and arbitration and international judicial tribunals have been utilized. The paper is a survey describing international practice regarding acceptance of "historic" or "traditional," transitional or other claims to the right of continued fishing by foreign fishermen in waters considered high seas brought under the jurisdiction or exclusive control of a coastal nation. The survey covers practices involving United States (U.S.)-Canada, U.S.-U.S.S.R., U.S.-Japan, U.S.-Mexico, Argentina, Chile-Ecuador-Peru, Mexico, Mexico-Japan, Nicaragua, Panama, Denmark-United Kingdom, Iceland-United Kingdom, North Sea Fisheries Convention, Norway-United Kingdom, Spain, U.S.S.R.-United Kingdom, South Africa, New Zealand-Japan, and Australia-Japan.
[51 references] [Abstracter: F. T. Piskur]

9.6 METHODS FOR ASSESSMENT OF FISH PRODUCTION IN FRESH WATERS

Ricker, W. E. (ed.)
Published by Blackwell Scientific Publications, Oxford, England and Edinburgh, Scotland, 328 pp. (1968) (IBP Handbook No. 3.). Available from F. A. Davis Co., 1914 Cherry Street, Philadelphia, Pennsylvania 19103. $6.50 paper.
Reviewed by Larry K. Puckett
California Fish and Game 55, No. 4, 342 (October 1969)

The International Biological Programme, a worldwide plan of research concerned with "the biological basis for productivity and human welfare", has sponsored a series of handbooks to be used by biologists around the world who are participating in the Programme. This volume is one of four concerned with methods of studying productivity in fresh waters.

Each of the 13 chapters is authored by internationally prominent biologists expert in such subjects as: capture, sampling, and examination of fishes; fish identification; tagging and marking; age and growth; population dynamics; causes of mortality; and others.

The detail of the several subjects varies. The chapter on capture, sampling, and examination of fishes by Karl F. Lagler is excellent. His description of gear and its use is, alone, worth the price of the book.

This book will make a valuable supplement to a fishery biologist's library. It is not for popular reading. [Partial reprint]

0.6 MEAT EMULSION ADDITIVE

U.S. Patent 3,449,124
Lipner, S.; Isolated Beef Protein Supplements, Inc. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Bovine protein concentrates are added to meat emulsions. The concentrate consists of the dried plasma component of bovine blood with disodium EDTA (ethylenediaminetetraacetate) as the anticoagulant. [Abstracter: F. T. Piskur]

0.6 RENDERING PROCESS

U.S. Patent 3,449,315
Aikins, G. A.; Armour & Co. (pat.)
Food Technology 23, No. 10, 92 (October 1969)

This patent covers a low-temperature rendering process for recovering fat and protein fractions from animal fatty tissues. [Abstracter: F. T. Piskur]

0.7 POLITICS, POVERTY, AND NUTRITION

Miller, Derek (Department of Nutrition, Queen Elizabeth College, London, England)
New Scientist 44, No. 671, 116-119 (October 16, 1969)

This critique of a recent report from Britain's Department of Health and Social Security points out the fallacies--and the social dangers--of equating poverty and malnutrition, in the first instance, and of superficial, politically inspired predications about malnutrition in the second. A definition of malnutrition may be approached by looking for clinical signs of deficiency in the population, a notoriously inaccurate approach that leads to endless medical argument; or it may be approached by comparing nutrient intakes with some set of standard requirements, an approach that relies on a definition of nutrient requirements. This, the reviewer says, is the reason for the report. But the report does not give the answers that are the first step toward solution. Nor does the committee that prepared the report apply the methodology and the techniques that could be of so much assistance in finding answers.

The report, No. 120 on Public Health and Medical Subjects, is available from Her Majesty's Stationery Office, London, England, for 5s 6d.

[Abstracter: L. Baldwin]

2.3 FISH DRESSING APPARATUS

German Patent 1,292,339
Arenco, A. H. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Fish are carried between two horizontal belts past cutting apparatus.

[Abstracter: F. T. Piskur]

2.1121 (1.85) AUSTRALIAN PRAWN TRAWLING GEAR

Lorimer, P. D., and W. J. Innes (Technical Advice Section, Fisheries Branch, Department of Primary Industry, Canberra, Australia)
Australian Fisheries Paper No. 6, 15 pp. (1969)
Australian Fisheries (Supplement) (September 1969)

This paper was written to assist fishermen in understanding how prawn nets are made and how the gear should be set. To this end, the authors give designs and specifications of some of the better known prawn nets and boards currently used in Australia; describe methods of finding the length of wire rope that winch drums can accommodate, the length of warp required, and how the angle of attack of otter boards can be checked; and explain, among other technical data, how footropes should be rigged. Simple illustrative line drawings accompany each discussion. [17 figures, 5 references] [Abstracter: L. Baldwin]

2.3 CRAB PROCESSING

U.S. Patent 3,441,981 (1969)
Tolley, C. B.
Food Science and Technology Abstracts 1, No. 9, 1177, Item 9R228 (September 1969)

A machine for squeezing meat from precut parts of hard-shelled crab has a rotating body equipped with several pairs of vanes; one vane in each pair moves toward and away from the other as the body rotates. [Extracter: L. Baldwin]

2.3 [MACHINE FOR SEPARATING FISH ROES]

U.S.S.R. Patent 233,197 (1969)
Zeidlits, A. B., E. N. Egoryan, and A. F. Moskalenko
Food Science and Technology Abstracts 1, No. 9, 1179, Item 9R243 (September 1969)

This separating machine consists of a loading mechanism, a sieve, some piercing devices, a collector, and a chute. It has the following features designed to improve the quality of the roe: the piercing mechanism is a spring-loaded, free-running, resilient disc with piercing fingers; several piercing stations are arranged vertically; washing stations are provided; fish are removed from the sieve by a flat blade; and the loading mechanism is a swinging chute that interlocks mechanically with the sieve system. [Extracter: L. Baldwin]

0.6 PREPACKAGED FOOD HEATER

German Patent 1,293,357
Eisler, Paul (pat.)
Food Technology 23, No. 10, 92 (October 1969)

Foods packaged in thin metal foil and of large surface area are heated by passing low voltage electric current through the foil. [Abstracter: F. T. Piskur]

2.3 FISH FILLETING APPARATUS

German Patent 1,292,340
Klostermann, O. and P. Klostermann (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Dressed fish are fed through vertical disc knives that remove the vertebrae and through horizontal disc knives that remove the lateral fins.

[Abstracter: F. T. Piskur]

1.83 (1.017)
THE AUSTRALIAN ABALONE INDUSTRY

Harrison, A. J. (Department of Agriculture, Tasmania)
Australian Fisheries 28, No. 9, 2-13 (September 1969)

Of the 15 species of abalone that live in the waters around Australia, 4 are fished commercially: Notohaliotis ruber (the black lip abalone, or red ear shell); Schismotis laevigata (the green lip abalone, or mutton fish); N. conicopora; and Marinauris roei. They are collected by skin divers mainly from the four principal fishing areas along the southeast coast. Yield of the fishery has increased steadily from 78.3 short tons, live weight, in 1963-64 (when the fishery was established) to 9,375.0 short tons in 1967-68; the value has increased from $26,000 to $2,675,000.

This survey of the industry has the following named sections: the resource, species and distribution, research, fishing areas, fishing methods, the catch, fishing effort, catch per unit effort, regulations (New South Wales, Victoria, Tasmania, South Australia, West Australia), processing and marketing, and prospects for development. [7 figures, 4 tables, 12 references] [Abstracter: L. Baldwin]

0.6 (9.6)
ASQC ISSUES NEW JOURNAL

Anonymous
Journal of Quality Technology
Published by the American Society for Quality Control, Administrative Secretary, Plankinton Bldg., 161 W. Wisconsin Ave., Milwaukee, Wis. 53203. Price $10.00.
Food Technology 23, No. 9, 82 (September 1969)

This new journal published quarterly will contain papers on quality technology emphasizing the practical application of new techniques, instructive examples of the operation of existing techniques, and results of historical researches.
[Abstracter: F. T. Piskur]

2.9 (1.88)
THE CAUSE OF MUSSEL POISONING IN SOUTH AFRICA

Grindley, J. R., and N. Sapeika (Museum and Oceanarium, Port Elizabeth, South Africa)
South African Medical Journal 43, No. 10, 275-279 (1969)
Food Science and Technology Abstracts 1, No. 9, 1180, Item 9R246 (September 1969)

Direct extraction of the toxin from Gonyaulax catenella showed that recent cases of mussel poisoning on the west coast of South Africa were caused by this phytoplankton. The toxicity was found to be similar to that of the phytoplankton found off the coast of California. The nature and action of the toxin are discussed, and the significance of mussel poisoning in South Africa is analyzed.
[30 references] [Extracter: L. Baldwin]

2.1473 (1.120)
CATCH TENDENCY OF TUNA LONG LINES FISHERY IN OCEAN AND ITS CONSIDERATION

Yamaguchi, Yuichiro, and Hiroshi Kobayashi
Journal of Faculty of Fisheries Prefectural University of Mie 7, No. 3, 237-254 (December 14, 1968) (Faculty of Fisheries, Prefectural University of Mie, Tsu, Mie Prefecture, Japan)

The authors collected data on longline fishing for tuna for use as a basis for improving tuna fishing operations. They found that albacore tuna survived for about 2 hours after being caught; yellowfin tuna, about 2 hours and 10 minutes; and bigeye tuna, about 3 hours and 24 minutes. The catch rate of all three species was greater during daylight hours than at night. The catch at night showed the following descending order of abundance: bigeye tuna, albacore, and yellowfin tuna. There was no correlation between the rate of catch and the phase of the moon. [8 figures, 2 tables, 5 references] (Text and titles of figures and tables are in English. References are in Japanese) [Abstracter: F. T. Piskur]

2.1111
TREATMENT OF FISHING NET MATERIALS

U.S.S.R. Patent 239,915
Mishina, E. M., I. V. Korchagina, T. E. Promashkova, and R. G. Galieva (Special Experimental Design Bureau for the Fishing Industry)
Chemical Abstracts 71, No. 12, 51181h (September 22, 1969)

[Extracter: L. Baldwin]

2.2
LANDING THE CATCH BY MECHANICAL MEANS

Anonymous
Materials Handling News 1969, No. 139, 28-32 (1969)
Food Science and Technology Abstracts 1, No. 9, 1179, Item 9R239 (September 1969)

Three pieces of equipment, installed as a result of investigations by a work-study team, have improved fish handling at the port of Grimsby. The equipment consists of a mechanical weighing and tipping unit, a modified Sherpa lift truck, and a light two-wheeled hand trolley, all manufactured to the study team's specifications. With the equipment, fish handling is mechanized from the time it is landed for auction. [Extracter: L. Baldwin]

2.3
FISH DEBONING

German Pending Patent Application 1,454,082
Nordischer Maschinenbau Rud. Baader (pat.)
Food Technology 23, No. 10, 58 (October 1969)

Bones are removed from fish through incisions made on either side of the belly; the incisions reach up to the vertebrae. [Abstracter: F. T. Piskur]

0.7 (1.016)
FOOD COMPOSITION TABLE FOR USE IN AFRICA

Leung, W. T. Wu, F. Busson, and C. Jardin (compilers)
Published by the Nutrition Program, National Center for Chronic Disease Control, U.S. Public Health Service, 9000 Rockville Pike, Bethesda, Maryland 20014. 306 pp. (n.d.)
Reviewed by Norman E. Bednarcyk
Food Technology 23, No. 9, 88 (September 1969)

This book brings together most of the analytical data available on composition and nutrient content of those foods consumed in large amounts in all of Africa. The tables provide useful information for those involved in the evaluation and improvement of the diets consumed in Africa. [Abstracter: F. T. Piskur]

3.2387 EIGNUNGS-PRÜFUNG NEUER NICHT-NÄSSENDER VERPACKUNG FÜR DEN STÜCKGUT-VERSAND VON FRISCHFISCH MIT DER BUNDESBAHN
[SUITABILITY OF A NEW NONWETTING PACKAGE FOR PIECE GOODS FOR RAILWAY TRANSPORT OF FRESH FISH]

Meyer-Waarden, P. F. (Inst. für Biochemie und Technologie, Bundesforschungsanstalt für Fischerei, Hamburg, West Germany)
Allgemeine Fischwirtschaftszeitung 21, No. 15, ix-xvi (1969) (Bremerhaven F., West Germany)
Food Science and Technology Abstracts 1, No. 9, 1177, Item 9R231 (September 1969)

Fish were packed in 25 mm. Styropor boxes coated with cardboard, aluminum, or low-pressure polyethylene and transported for 3 days; at 20° C., no sensory, chemical, or microbiological deterioration occurred. The cardboard- and aluminum-coated boxes maintained the lowest temperature (from 3° to 5° C.). The volatile base and trimethylamine nitrogen content of the fish packed in all types of Styropor box were relatively high; melt water was almost clear and free of odor in all the boxes but those coated with plastic. The boxes were also tested and found suitable for use in storerooms. [Extracter: L. Baldwin]

3.17 FISH PRESERVATION
German Patent 1,293,009
Brandt, Karl (pat.)
Food Technology 23, No. 10, 58 (October 1969)
Fish are preserved in ice that contains alkylol resins.
[Abstracter: F. T. Piskur]

3.4 [REDUCING THE CONTENT OF CARCINOGENIC POLYCYCLIC HYDROCARBONS IN SMOKED FOOD PRODUCTS]

Dikun, P. P., N. D. Krasnitskaya, V. A. Lipova, I. A. Shendrikova, O. P. Gretskaya, and A. V. Emshanova (Lab. Biofiziki, Nauchno-issled. Inst. Onkologii imeni N.N. Petrova Ministerstva Zdravookhraneniya SSSR, Leningrad, U.S.S.R.)
Voprosy Pitaniya 28, No. 3, 81-85 (1969) (In Russian)
Food Science and Technology Abstracts 1, No. 9, 1178, Item 9R237 (September 1969)

The authors determined the 3,4-benzopyrene content of fish smoked in six modern smoking installations. Fish from the two hot-smoke ovens, a rotary kiln and a vertical kiln, contained from 0.6 to 6.3 µg. of the compound per kilogram of fish, not differing in this respect from that contained in fish hot-smoked over a log fire. Fish from the four cold-smoke installations had much lower values, fish from the two installations that generate smoke by low-temperature sawdust combustion contained either from 0 to 0.19 µg. or 0 µg. of 3,4-benzopyrene per kg. of herring. Fish from a modernized tunnel kiln and from the TsKTB Azcherryby smoke generator contained 0.1 to 0.25 µg. per kg. herring and 0.05 to 3.6 µg. hydrocarbons per kg. sardelle and sardine, respectively.
[13 references] [Extracter: L. Baldwin]

3.337 [THE CONTROL OF THE WORKING RHYTHM OF PROCESSING LINES]

Shevelev, V. A., and A. V. Gnatkovskii (Inst. Pischepromavtomatika, U.S.S.R.)
Rybnoe Khozyaistvo 45, No. 3, 51-52 (1969)(In Russian)
Food Science and Technology Abstracts 1, No. 9, 1177, Item 9R230 (September 1969)

The Institute for Food Industry Automation has designed an electronic apparatus that registers the working rhythm for each processing operation and compares the work actually being done with a standard for the labor. The apparatus has been installed on the canned-fish production line at the Murmansk fish combine, where it is being used to rationally organize and systematically control the work at various junctures in the processing line. [Extracter: L. Baldwin]

3.336 CULINARY SEASONING SALT AND METHOD FOR MAKING THE SAME
British Patent 1,160,191
Morton International Inc. (U.S.A.) (pat.)
B.F.M.I.R.A. Abstracts 22, No. 9, Abstract No. 1850, 475 (September 1969)
The preparation, a dietetic salt, contains potassium chloride and sodium chloride. Apparently the sodium chloride masks the bitter flavor of the potassium chloride.
[Abstracter: F. T. Piskur]

3.5 CURING MIXTURES
(6.54, 3.4)

Cristea, E.
Industria alimentara 19, 88 (1968)
Food Manufacture 44, No. 4, 43 (April 1969)

Chemical and organoleptic tests were carried out to establish the best curing mixtures for meat used in fresh and half-smoked salami sausages and to find ways of reducing maturation times. A mixture containing sodium chloride with 0.5 percent sodium nitrite reduced ripening time by from 50 to 83 percent, depending on the temperature of the meat, and gave a better color than ordinary brine gives. Technical experiments with the mixture showed that its use would permit savings in auxiliary material, freezing energy, vessel depreciation, and room space.
[Abstracter: L. Baldwin]

3.8 USE OF LACTIC ACID FOR PICKLING HERRINGS
(1.22)
Houwing, H.
Z. Lebensmitteluntersuch. u.-Forsch. 139, No. 6, 348-357 (1969) (In German)
B.F.M.I.R.A. Abstracts 22, No. 10, Abstract No. 1923, 495 (October 1969)
It was possible to replace some of the acetic acid of the marinading liquid by lactic acid to make products of milder, less acid tastes. A lower initial pH was required with the mixed acids than with acetic acid alone to ensure that the final pH was low enough to suppress microbial growth. [Reprinted]

3.336 STUDIES ON UTILIZATION OF AMINO ACIDS FOR FOODSTUFF-II. ADDITION OF BASIC AMINO ACIDS TO CANNED MEAT

Miyake, Masato, Akiko Tanaka, and Ken Kawakami (Central Research Laboratories Ajinomoto Co., Inc., Kawasaki, Japan)
Report of Faculty of Fisheries Prefectural University of Mie 6, No. 2, 67-73 (December 20, 1968)

Miyake and Kawakami (1966) found that amino acids were effective in increasing the elasticity of fish meat jellies. Later the present authors found that some amino acids improve the water holding capacity and the color of meat, and also prevent the meat juice from becoming turbid. Basic amino acids and their salts are particularly effective.

In model experiments with canned yellowfin tuna, addition of arginine improved the yield (drained weight?) and quality of the meat. In experiments with canned abalone meat, addition of lysine or arginine made the meat more tender and the liquid portion was less turbid than that of the control samples. Addition of amino acids tends to reduce curd in the canned fishery products.
[8 tables, 1 reference] [Abstracter: F. T. Piskur]

3.336 STERILIZATION APPARATUS

British Patent 1,157,373
Soc. Financiere et Industrielle Des Ateliers et Chantiers de Bretagne and M. Beauvais (France) (pat.)
B.F.M.I.R.A. Abstracts 22, No. 9, Abstract No. 1830, 472 (September 1969)

Canned or bottled foods are rotated as they travel horizontally in the sterilizing apparatus. [Abstracter: F. T. Piskur]

3.2387 FISCHKASTEN AUS KUNSTSTOFF [PLASTIC CRATES FOR TRANSPORTING FISH]

West German Patent Appln. 1,283,740 (1968)
Strömberg, S. P. (Svein Strömberg og Co. AS)
Food Science and Technology Abstracts 1, No. 9, 1080-1081, Item 9F592 (September 1969)

The crates described have sides with vertical cavities inside, walls that widen into an open groove extending along the upper edge of the crate, and reinforcing struts that cover the groove and project into the vertical cavities. The result is a container that is very strong. [Extracter: L. Baldwin]

3.334 SHELLFISH PRESERVATION

Canadian Patent 814,944 (1969)
Erasmie, S. E. O. (AB Skalkjur) (pat.)
Food Science and Technology Abstracts 1, No. 9, 1081, Item 9F593 (September 1969)

Shellfish are packaged in a resilient container in a preserving liquid (for example, brine), and the air is evacuated from the container, causing the liquid to penetrate into the cavities of the shellfish. [Extracter: L. Baldwin]

4.20 (3.4) (6.132) A LIPID ANALYSIS OF THE GREATER SILVER SMELT [ARGENTINA SILUS (ASCANIUS)] AND AN EVALUATION OF ITS POTENTIAL FOR FOOD AND FISH MEAL PRODUCTION

Mackie, P. R., and R. Hardy (Ministry of Technology, Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 4, No. 3, 241-253 (September 1969)

Samples of the greater silver smelt were examined for their possible use as food for human consumption and for the production of fish meal. Apparently, the smelt is acceptable as a food fish. Because of the unsaturated nature of the oil of the flesh of the fish, appropriate precautions should be taken to minimize the development of rancidity if the fish are to be held for extended periods in frozen storage. The lipid content of the flesh ranged from 1.9 to 4.1 percent.

The amino-acid content of the fish would indicate that the meal produced from the fish would be at least equal to herring meal as a feedingstuff.
[3 figures, 10 tables, 13 references] [Abstracter: F. T. Piskur]

4.11 (1.22) (7.53) APPLICATION OF RAPID REFRACTOMETRIC FAT DETERMINATION FOR FISH AND FISH PRODUCTS. II. DETERMINATION OF FAT CONTENT IN DIFFERENT TYPES OF FISH

Schober, B., and R. Horn (Fischereiforschungsinst., Rostock, Germany)
Chemical Abstracts 71, No. 11, 48358r (September 15, 1969)

3.4 (2.05) AN EVALUATION OF THE BOTULISM HAZARD IN VACUUM PACKED SMOKED FISH

Hobbs, G., D. C. Cann, and Barbara B. Wilson (Torry Research Station, Ministry of Technology, Aberdeen, Scotland)
Journal of Food Technology 4, No. 2, 185-191 (June 1969)

In Britain, two types of smoked fish are marketed as "boil-in-the-bag" products--kippers and smoked haddock. Both types are produced by a cold-smoke process. Previous workers have shown that if these products are contaminated with Clostridium botulinum type E, toxin may develop when these products are stored at a suitable temperature. The present study was carried out to establish the boiling time required to destroy any preformed toxin in these "boil-in-the-bag" products. The authors found that a boiling time in excess of 5 min. is necessary to insure that no toxin survives the cooking process. (The total immersion time varied depending upon the size and the initial temperature of the products. The longest immersion time was 12½ min. for fish at an initial temperature of -20° C.).
[1 figure, 3 tables, 28 references] [Abstracter: F. T. Piskur]

3.4 MEAT SMOKING

German Pending Patent Application 1,492,627
Hilker, D. (pat.)
Food Technology 23, No. 10, 58 (October 1969)

This patent covers a continuous process for drying, smoking, boiling, and cooling meat products. [Abstracter: F. T. Piskur]

5.7 (4.92) VITAMIN E DEFICIENCY AND FAT STRESS IN THE DOG

Hayes, K. C., S. W. Nielsen, and J. E. Rousseau, Jr. (Institute of Nutrition and Food Science and Storrs Agricultural Experiment Station, University of Connecticut, Storrs)
Journal of Nutrition 99, No. 2, 196-209 (October 1969)

This study of vitamin E deficiency in dogs was based on earlier clinical and necropsy findings from several dogs at a kennel where the animals had developed a tocopherol deficiency after having been fed a diet containing large amounts of polyunsaturated fats. In the present study, male beagle puppies were fed vitamin E-deficient diets with four levels (1, 5, 10, and 15 percent) of safflower oil with or without vitamin E supplement for a 15-week period. The dogs fed the unsupplemented diet developed a vitamin E deficiency that was correlated with increased dialuric acid hemolysis of red cells and decreased plasma tocopherol values. The requirement for tocopherol was directly related to the consumption of polyunsaturated fatty acids and was apparently associated with the metabolism of the fat and not with an antioxidant role of the vitamin.
[7 figures, 6 tables, 50 references] [Abstracter: F. T. Piskur]

9.6 ABSTRACTING SERVICES IN SCIENCE, TECHNOLOGY, MEDICINE, AGRICULTURE, SOCIAL SCIENCES, HUMANITIES

Anonymous
Published by the Federation Internationale de Documentation, (FID), 7 Hofweg, The Hague, The Netherlands (December 1969), Volume 1. Science, Technology, Medicine, Agriculture. Price $10.00. Volume 2. Social Sciences and Humanities. Price $5.00.

This revised edition of the directory first published in 1965 (FID pub. 372) is in two volumes. Volume 1 lists 1,300 abstracting services (journals and card services); volume 2 lists 200. Both volumes are arranged in two sections:
Section 1. Alphabetical list of abstracting services.
Section 2. Titles arranged by subject.
The alphabetical lists of subjects are in English, French, Russian, and Spanish.
For further information, readers should write to the FID or to: National Federation of Science Abstracting and Indexing Services, 2102 Arch Street, Philadelphia, Pennsylvania, U.S.A. 19103. [Abstracter: F. T. Piskur]

7.51 [COLORIMETRIC PROTEIN DETERMINATION IN CANNED FISH PRODUCTS]

Kutulas, K. (Katedra Nauki o Srodkach Spozywczych i Higieny Zywienia, Akad. Med., Lublin, Poland)
Przemysl Spozywczy 23, No. 4, 159-160 (1969)
Food Science and Technology Abstracts 1, No. 9, 1178, Item 9R234 (September 1969)

A method is described for measuring colorimetrically against a standard curve the amido black in supernatant liquid from treated fish solids drawn from the can. Replicate tests on three samples each of eleven varieties of canned fish products agreed within ±5.33 percent with corresponding Kjeldahl values.
[17 references] [Extracter: L. Baldwin]

9.6 (7.0, 0.39) METHODS IN MICROBIOLOGY

Norris, J. R. (Milstead Laboratory of Chemical Enzymology, Sittingbourne, Kent, England), and D. W. Ribbons (Department of Biochemistry, School of Medicine, University of Miami, Florida, and Howard Hughes Medical Institute, Miami, Florida) (eds.)
Nature 222, No. 5198, xxv-xxviii (June 14, 1969)

During the past two decades, the rapid development of microbiology has led to the rise of an enormous number of technical methods applicable to most facets of the subject. Many of these methods are documented only in various scientific journals. This seven-volume work attempts to bring together the practical information needed by research workers in general microbiology and microbial biochemistry. More than 150 contributors provide not only the technical details of microbiological research methods but brief discussions of the theoretical background of the procedures described. Although four volumes are projected for publication in 1969, only one has been issued so far; two are in press. Pertinent data about these three follow:

Volume 1 - June 1969, xiv + 712 pp. Price 170s.
Volume 2 - 1969, 450 pp. Price 125s.
Volume 3a - 1969, 650 pp. Price 160s.
Volume 3b - 1969, 300 pp. Price 95s.

Academic Press of London and New York is the publisher. [Abstracter: L. Baldwin]

7.81 COMPARATIVE STUDIES ON CERTAIN BIOCHEMICAL METHODS FOR DETERMINING THE FRESHNESS OF FROZEN OCEAN FISH

Todorov, Ivan (Diagn. Prophyl. Vet. Sta., Burgas, Bulgaria)
Chemical Abstracts 71, No. 13, 59713d (September 29, 1969)

9.12 (9.17) A GENERALIZED COMPUTER SIMULATION MODEL FOR FISH POPULATION STUDIES

Walters, Carl J. (Colorado Cooperative Fishery Unit, Colorado State University, Fort Collins 80521)
Transactions of the American Fisheries Society 98, No. 3, 505-512 (July 1969)

The article describes a generalized computer model for determining fishing rates that will produce maximum long-term yields. The model uses age-specific natural mortality rates, growth rates, relative fecundities, and any stock-recruitment relations that may be desired. Best-harvest procedures are found by treating long-term yield as a response surface on the set of age-specific and year-specific fishing rates. Application of the model is illustrated by use on data for arctic cod (Gadus morhua), brook trout (Salvelinus fontinalis), and a hypothetical population with strong age-class dominance. The best predicted management procedures include periodic harvesting when age at entry to the fishery cannot be controlled; however, a constant fishing rate usually gives maximum yield. [6 figures, 4 tables, 10 references] [Abstracter: L. Baldwin]

9.6 (7.0) WITH A CERTAIN UNUSUAL LEVEL OF UNIFORM QUALITY

Diemair, W. (ed.)
Analysis of Foods, Detection and Determination of Food Components. Vol. 2, Part II of Handbook of Food Chemistry. (Analytik der Lebensmittel, Nachweis und Bestimmung von Lebensmittel-Inhaltsstoffen)
Published by Springer Publ. Co., Heidelberger Platz 3, 1 Berlin 31 (Wilmersdorf), Germany. 1,552 pp. (1967) $97.25. Foreign, DM389,—.
Reviewed by Y. Pomeranz
Food Technology 23, No. 10, 66, 68, 96 (October 1969)

This book is Part II of volume 2; it is one of 11 books planned for the series. Volume 1, edited by J. Schormuller, covers the composition of foods. Part I of volume 2 deals with the physical and physicochemical determinations of foods; Part II deals with chemical and biological procedures. Part II contains 24 chapters written by 28 experts. The reviewer states that the volume can be recommended as a valuable reference work and an important comprehensive treatment of the theoretical and applied aspects of food analysis. [Abstracter: F. T. Piskur]

6.32 (8.69) TOCOPHEROL CONTENT OF SEAWEED AND SEAWEED MEAL
I. ANALYTICAL METHODS AND DISTRIBUTION OF TOCOPHEROLS IN BENTHIC ALGAE

Jensen, A. (Norwegian Institute of Seaweed Research, N-7034 Trondheim-NTH, Norway)
Journal of the Science of Food and Agriculture 20, No. 8, 449-453 (August 1969)

The author has developed a rapid and reliable method for the identification and quantitative determination of tocopherols in marine algae. By his method, the algal tocopherols are separated from each other and from other lipids by circular chromatography on paper that contains aluminum oxide. The author found, using this method, that α-tocopherol was the only tocopherol detectable in all the brown, red, and green seaweeds tested except for those belonging to the Fucaceae family. The Fucaceae family of seaweeds also contained the γ- and δ-tocopherols. [5 tables, 25 references]

II. Individual, Diurnal and Seasonal Variations in Some Fucaceae.--Ibid. 454-458.

The seasonal variation in tocopherol content in four brown seaweeds was followed over a 2-year period. Considerable variation in the tocopherol (especially the δ homolog) content was found. The higher concentrations in the seaweeds were found during autumn and winter; the lower concentrations during spring. Individual and diurnal variations in tocopherol content were also studied. The author found considerable differences in the tocopherol content between various types of tissues. Also, high concentrations of tocopherols were found in the older parts of the plants.
[6 figures, 3 tables, 9 references] [Abstracter: F. T. Piskur]

9.6 (0.6) FOOD PACKAGING. A GUIDE FOR THE SUPPLIER, PROCESSOR AND DISTRIBUTOR

Sacharow, Stanley, and Roger C. Griffin, Jr.
Published by Avi Publishing Company, Box 670, Westport, Connecticut 06880, 432 pp. (1969) Price $16.00 (Foreign $17.00 plus postage and packing charges)

This book provides laymen, engineers, scientists, and marketing and sales personal a comprehensive view of the role packaging plays in the success of the food industry. It contains 14 chapters, 4 of which are of particular concern to seafood interests: the first, on "The Evolution of Food Packaging"; the second, on "Basic Food Processing"; the sixth, on "Fish and Shellfish"; and the fourteenth, on "Statutary and Religious Regulations Affecting Food Packing." The remaining chapters deal with other food products. Each major food category is discussed in relation to the total market, the properties of the food, and the requirements that the package must meet. [Abstracter: F. T. Piskur]

9.6 (9.1) CEPHALOPODS OF HONG KONG

Voss, G. L. (Inst. Marine Sciences, Miami, Florida 33149), and G. R. Williams (Fisheries Research Station, Aberdeen, Hong Kong)
Cephalopods of Hong Kong, 200 pp., 64 color plates (1970). Published by the Hong Kong Government Printer, Java Road, North Point, Hong Kong. Price HK$30.00, incl. sea mail postage.

Thirty-four species of cephalopods are described: 12 species of cuttlefish, 10 species of squid, and 12 species of octopus. The synonomy, morphology, maximum size, living colors, range of distribution, habits, and the commercial fishery of each species are presented. Each species is illustrated by line drawings. There are, also, 64 full-page color plates. [Abstracter: F. T. Piskur]

9.14 (9.16) USE OF UREA IN FISH PONDS

Tasnadi, Robert, and Rezso Vamos (Szeged Fish Farm, Szeged, Hungary)
Chemical Abstracts 71, No. 12, 53367x (September 22, 1969)

6.37 A NEW DIETETIC PRODUCT OBTAINED FROM BUTTERMILK

French Patent 1,497,490
Flechard, R. (pat.)
Dairy Sci. Abstr. 31, No. 6, Abstr. No. 2051 (1969)
B.F.M.I.R.A. Abstracts 22, No. 9, Abstract No. 1853, 476 (September 1969)

The dietetic beverage product contains algae, casein, and stabilizers (optional) such as carrageenan or agar-agar. [Extracter: F. T. Piskur]

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Whitney, Richard R.	15	9.12
Williams, G. R.	26	9.6
Wilson, Barbara B.	24	3.4
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to

COMMERCIAL FISHERIES ABSTRACTS

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